Universal RAID Utility
Ver 2.0
User's Guide

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Introduction

This User's Guide describes RAID System management utility "Universal RAID Utility Ver 2.0".

See "Appendix A : Glossary" for the terms on the Universal RAID Utility and those used in this User's Guide. "Universal RAID Utility" means "Universal RAID Utility Ver 2.0".

Before the Universal RAID Utility can be used, you should carefully read the User's Guide of the RAID System managed by the Universal RAID Utility and that of the computer in which the RAID System is installed.

The User's Guide is intended to be read by engineers who are fully familiar with the functions and operations of Windows and Linux. Refer to the Window and Linux online help and related documentation for the operations and concerns of Windows and Linux.

Symbols used in the text

The User's Guide uses the following three symbols. Follow these symbols and their meanings to use the Universal RAID Utility appropriately.

Symbol	Description
	Indicates a matter or caution you should particularly obey on operations of the Universal RAID Utility.
	Indicates a notice you should check to operate the Universal RAID Utility.
	Indicates effective or convenient information which help you if you know them.

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Overview

This chapter describes the overview of the Universal RAID Utility.

What is Universal RAID Utility?

The Universal RAID Utility enables RAID Systems in a computer to be managed.

The Universal RAID Utility is characterized as follows.

1. Allowing a variety of RAID Systems to be managed

   Conventionally, a specific management utility must be used for each RAID System. On the other hand, only the Universal RAID Utility can manage more than one RAID System. For the RAID Systems which the Universal RAID Utility can manage, refer to the documentation on computers and RAID Systems.

2. Operating in either Standard or Advanced Mode

   The Universal RAID Utility can operate in two running modes, which are Standard Mode and Advanced Modes. The Standard Mode provides the Universal RAID Utility with standard management functions of RAID Systems. The Advanced Mode provides the Universal RAID Utility with advanced management and maintenance functions of RAID Systems.
   Using the two running modes appropriately depending on users and jobs allows the usability of the Universal RAID Utility to be improved and malfunctions to be avoided.

3. Configuring RAID Systems easily

   Using the Universal RAID Utility, you can configure a RAID System easily without expert knowledge of the RAID System.
   The Universal RAID Utility provides the "simple Logical Drive create function" allowing a Logical Drive to be created by selecting only two selection items according to the guide of the Universal RAID Utility and the "Easy Configuration" allowing a RAID System to be configured only by defining uses of unused Physical Devices.

4. Supporting general functions required for configurations, operations and maintenances of RAID Systems

   The Universal RAID Utility supports general functions for configuring a RAID System (including creating Logical Drive and making Hot Spare), general operation functions (including log recording, Patrol Read and Consistency Check), and general functions required for maintenance (including Rebuild and Locate functions).

5. Troubleshooting RAID Systems

   The Universal RAID Utility can detect failures occurred in RAID Systems by using various functions.
   The RAID Viewer, the GUI of the Universal RAID Utility, indicates the configurations and status of RAID Systems comprehensibly with trees and icons. The raidcmd, the CLI of the Universal RAID Utility, indicates the same information too. In addition, the Universal RAID Utility registers failures occurred in RAID Systems not only to the dedicated log but also the OS log. Further, the Universal RAID Utility can send alerts to the NEC ESMPRO Manager normally attached to NEC Express series systems.

Structure of Universal RAID Utility

The Universal RAID Utility consists of the following modules:

- **raidsrv service**

  The raidsrv service always operates in the computer to manage RAID Systems. Receiving a processing request from the RAID Viewer or raidcmd, the raidsrv service provides proper information on a RAID System or performs an appropriate operation for the RAID System. In addition, the raidsrv service manages events occurred in RAID Systems, notifies the RAID Viewer of the events and/or registers them to several logs.

- **RAID Viewer**

  The RAID Viewer is the Windows application managing and monitoring the RAID system by GUI. The RAID Viewer displays the configuration and status of a RAID System graphically or provides configuration and operation for a RAID System.

- **Log Viewer**

  The Log Viewer is the Windows application viewing the event of RAID system. The Log Viewer allows you to see the RAID Log in which events occurred in RAID Systems are registered.

- **raidcmd**

  The raidcmd is the application managing and monitoring the RAID system by CLI.
  The raidcmd is the command that indicates the configuration and status of a RAID System or operates on a console providing configurations and operations.

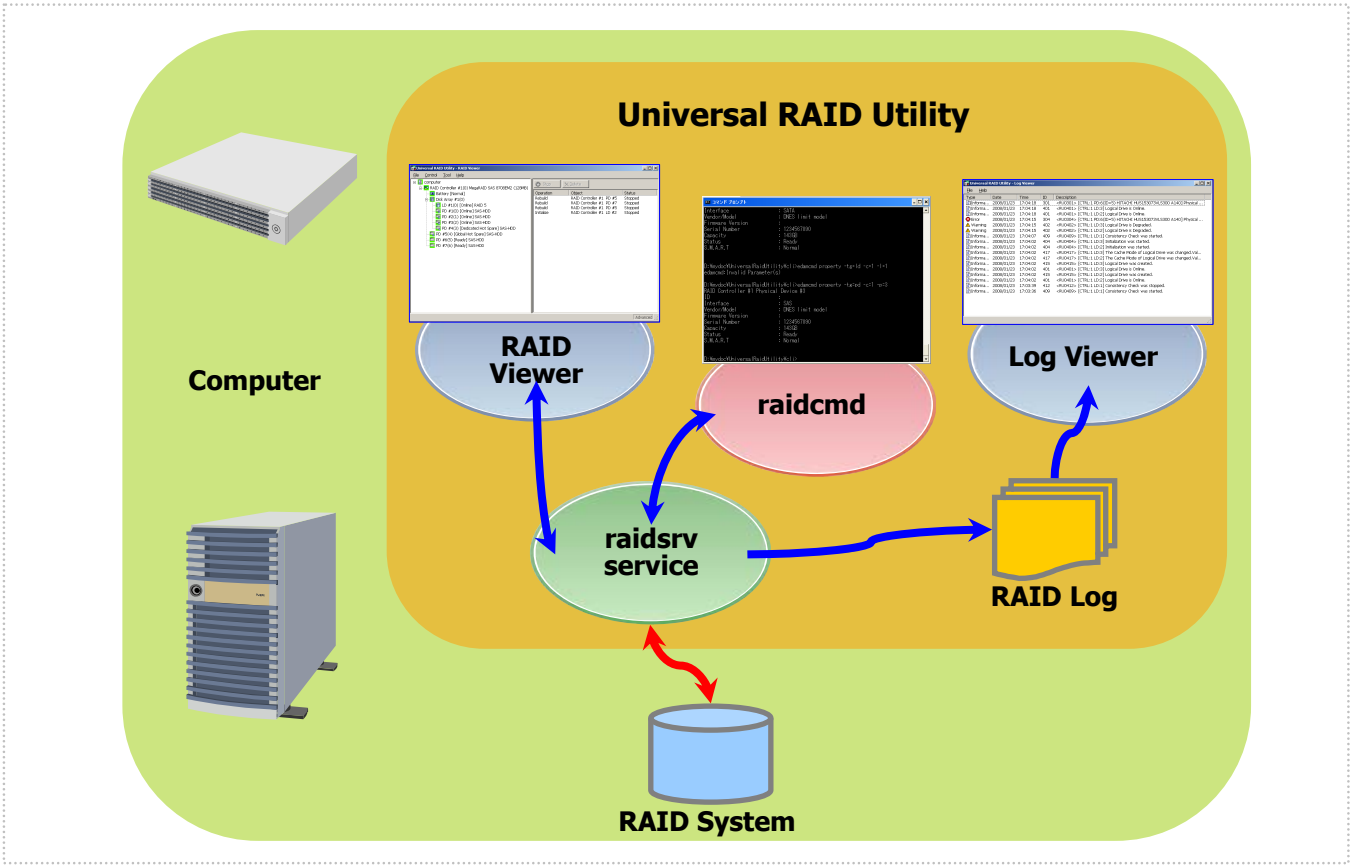


Figure 1 Configuration of Universal RAID Utility

The usable modules are different by the version of Universal RAID Utility or the kind of operating system. See the following table for detail.

Operating System	Windows	Linux	VMware ESX Server
raidsrv service	✓	✓	✓
RAID Viewer	✓		
Log Viewer	✓		
raidcmd	✓	✓	✓

Functional difference from Universal RAID Utility Ver1.4

Universal RAID Utility Ver2.0 executed the functional enhancement and the function change in the following from Ver1.4.

1. **Addition of hardware for management**
   - "Promise RAID Controller" is added to the RAID Controller for management
   - SSD(Solid State Drive) is supported
     HDD and SSD can be distinguished by the item of the device type in the property of a Physical Device. See "Referring to Property of Physical Device".
     HDD and SSD cannot exist together in the same Logical Drive. Be careful when creates a Logical Drive or create the Hot Spare.
   - Physical Devices other than HDD(SSD is included) are managed
     The tape device, the CD drive, and the DVD drive connected with the RAID controller can be referred to in the tree view and property. However, the state monitoring functions of a physical device other than HDD (SSD is included) are not supported.
2. **Configuration**
   - The condition that a logical drive can be deleted is changed
     You are not able to delete a Logical Drive with boot partition until Ver 1.4.
     The condition of the Logical Drive that was able to be deleted was changed in Ver 2.0. For detail, see "Deleting Logical Drive".
3. **Operation**
   - The initialization execution condition of a logical drive is changed
     You are not able to initialize a Logical Drive with boot partition until Ver1.4.
     The condition of the Logical Drive that was able to be initialized was changed in Ver2.0. For detail, see "Initializing Logical Drive".
   - Timing in which the Patrol Read is executed is changed
     The Patrol Read was executed always continuously until Ver1.4.
     The timing in which the Patrol Read is executed is changed in Ver2.0. For detail, see "Providing Patrol Read for Physical Devices".
   - The way of turn off the lamp for checking location of Physical Device is changed
     To turn off the lamp for checking location of Physical Device, always use the RAID Viewer or raidcmd until Ver1.40. When the fixed time had passed since the lamp was turned on, the function to turn off the lamp was added in Ver2.0.
4. **Display of information**
   - The tree view of the RAID viewer is changed
     The Disk Array and the Battery were newly displayed as a node, and the entire tree composition was changed. For detail, see "Tree View".
   - The design of the icon used by the RAID viewer is changed

- Use the omission mark in the RAID Viewer and raidcmd. The Logical Drive is displayed as "LD" and Physical Device is displayed as "PD".
- "Queued" and "Paused" is added to the status of operation
- The update function about information of RAID system is added
  Supports "Rescan" of RAID Viewer and "**rescan**" command of raidcmd as the function which updates the managed information in the Universal RAID Utility in Ver 2.0. Deleted the old "Rescan" function of RAID Viewer of Ver1.4.

5. Log/Event

For detail, see "Appendix B : Logs/Events".

- Change address description in the event of Physical Device
  It became one parameter though the vendor and model of a Physical Device were separate parameters.
- Add Log/Event
  ID : 0213 - 0217, 0321 - 0324, 0426 - 0434, 0509, 0607
- Change content of Log/Event
  ID : 0319, 0320, 0413, 0422, 0423, 702

6. Usability

- Add help function of raidcmd
  For detail, see "help".

Setup of Universal RAID Utility

This chapter describes installation or uninstallation of the Universal RAID Utility.

Operation Environments

The Universal RAID Utility can operate in the following environments.

Hardware

Computers

The computers can contain RAID Systems to be managed by the Universal RAID Utility.

RAID Systems to be managed by Universal RAID Utility

For RAID Systems which can be managed by the Universal RAID Utility, refer to the documentation attached to the computer in which RAID Systems are installed and that attached to the RAID Controller including the Universal RAID Utility.

Software (Windows)

Operating systems

The Universal RAID Utility can operate in the following operating systems.
It can operate in either 32-bit or 64-bit environment for any operating system other than Windows 2000.

- Windows Server 2008
- Windows Server 2003 R2 SP1 or later
- Windows Server 2003 SP1 or later
- Windows 2000 SP4
- Windows Vista
- Windows XP Professional SP2 or later

If you use "Server Core Install Option" of Windows Server 2008, you can use raidcmd for the management of the RAID system only (You can not use RAID Viewer and Log Viewer).

Microsoft .NET Framework

To use the Universal RAID Utility, Microsoft .NET Framework Version 2.0 or higher is required.
If the operating system installed in your computer is any of those listed below, install Microsoft .NET Framework Version 2.0:

- Windows Server 2003 R2 SP1 or later
- Windows Server 2003 SP1 or later
- Windows 2000 SP4
- Windows XP Professional SP2 or later

For the installation of Microsoft .NET Framework Version 2.0 or higher, see "Preparing installation (Windows)".

Runtime component of Microsoft Visual C++ library

To use the Universal RAID Utility, the runtime component of the Microsoft Visual C++ library is required.

For the installation of the runtime component of the Microsoft Visual C++ library, see "Preparing installation (Windows)".

Software (Linux)

Operating systems

The Universal RAID Utility can operate in the following operating systems.
It can operate in either 32-bit or 64-bit environment for any operating system.

- Red Hat Enterprise Linux 4.5 or later
- Red Hat Enterprise Linux 5.1 or later
- MIRACLE LINUX V4.0 SP 2 or later
- Asianux Server 3

Software (VMware ESX Server)

VMware ESX Server

The Universal RAID Utility can operate in the following VMware ESX Server.

- VMware ESX 3.5 Update 1 or later

You must install the Universal RAID Utility in the ESX Server. Don't install in the virtual machine.

Others

System Requirements

Resource	Windows	Linux/VMware ESX Server
Available Hard Disk Space	50MB or more (not include Microsoft .NET Framework Ver2.0、the runtime of Microsoft Visual C++ 2005 SP1 library)	← (not include the required packages as standard C++ library...etc)
RAM	512MB or more	←

TCP ports used by Universal RAID Utility

The Universal RAID Utility uses the following two TCP ports.

TCP ports used by Universal RAID Utility
52805 and 52806

For the change of TCP ports number using Universal RAID Utility, see "Changing TCP port number".

Safe Mode and Single User Mode

The Universal RAID Utility uses the network function. Accordingly, the Universal RAID Utility is unavailable in any of the following safe modes in which the network function cannot operate.

- Safe Mode
- Safe Mode with Command Prompt
- Safe Mode with Networking

Also, cannot be used in the single user mode of Linux and VMware ESX Server. For how to use the Universal RAID Utility in the single user mode, see "Starting Universal RAID Utility in Single User Mode".

Installation and Uninstallation

This section describes the procedure of installation and uninstallation of Universal RAID Utility.
The working procedure is different by the kind of installation or uninstallation.

kind	Description
New Installation	Install Universal RAID Utility newly, when there is not Universal RAID Utility in the computer. Procedure (Windows) 1. Preparing installation (Windows) 2. New Installation (Windows) Procedure (Linux) 1. Preparing installation (Linux) 2. New Installation (Linux, VMware ESX Server) Procedure (VMware ESX Server) 1. New Installation (Linux, VMware ESX Server)
Update Installation	Install the new version of Universal RAID Utility, when there is the old version of Universal RAID Utility in the computer Procedure (Windows) 1. Update Installation (Windows) Procedure (Linux、VMware ESX Server) 1. Update Installation (Linux, VMware ESX Server)
Add Installation	Install or uninstall the program to control the RAID Controller after added or deleted the RAID Controller. Procedure (Windows) 1. Add Installation (Windows) Procedure (Linux、VMware ESX Server) 1. Add Installation (Linux, VMware ESX Server)
Uninstallation	Uninstall Universal RAID Utility from the computer. Procedure (Windows) 1. Uninstallation (Windows) Procedure (Linux、VMware ESX Server) 1. Uninstallation (Linux, VMware ESX Server)

Use the setup program of Universal RAID Utility for the installation and the uninstallation.
The setup program is contained in the installation image of the Universal RAID Utility. Before the Universal RAID Utility can be installed or uninstalled, you must prepare the installation image.

The setup program of Windows is " setup.exe". The setup program of Linux and VMware ESX Server is "setup.sh".

The installation image of the Universal RAID Utility for Windows and Linux is contained in an accessory of the computer or RAID Controller.

About Universal RAID Utility for VMware ESX Server, please contact our support.

IMPORTANT

- **A user having the administrator authority should install or uninstall the Universal RAID Utility in the computer. Only users having the administrator authority can execute the setup program.**
- **If you use "Server Core Install Option" of Windows Server 2008, there is not [Start] menu. You must run setup.exe on the [Administrator : Command Prompt].**
- **If you use VMware ESX Server, press Alt key and F1 key at boot screen of VMware ESX Server to switch to service console. Log in to VMware ESX Server with administrator authority to install or uninstall Universal RAID Utility.**
- **You must close RAID Viewer and Log Viewer, raidcmd, Event Viewer when will uninstall Universal RAID Utility.**

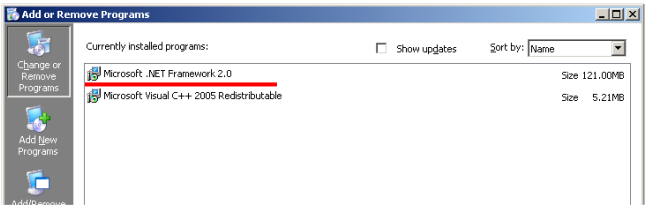
Preparing installation (Windows)

The Universal RAID Utility uses Microsoft .NET Framework Version 2.0 or higher. Install Microsoft .NET Framework Version 2.0 or higher if it does not exist in the computer where the Universal RAID Utility is to be installed.

TIPS

Windows Vista and Windows Server 2008 include .NET Framework Version 2.0 or higher. Therefore, you don't need to install .NET Framework in case of using them as operating system.

Step 1 Click [Start] - [Control Panel]. Then double-click [Add or Remove Program].



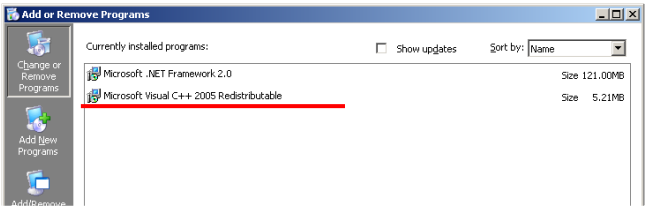
Step 2 Click [Change or Remove Program] to list [Currently installed programs]. If the following programs exist in the list of [Currently installed programs], Microsoft .NET Framework may not be installed. If the following packages do not exist, install the package(s).
- [Microsoft .NET Framework 2.0] (for x64, [Microsoft .NET Framework 2.0 (x64)])

Step 3 Microsoft .NET Framework Version 2.0 uses different packages depending on the CPU architecture. See the table below to download and install the required packages.

CPU architecture	Required components and their vendors
x86	[Microsoft .NET Framework Version 2.0 Redistributable Package (x86)] http://www.microsoft.com/downloads/details.aspx?FamilyID=0856EACB-4362-4B0D-8EDD-AAB15C5E04F5&displaylang=en
x64	[Microsoft .NET Framework Version 2.0 Redistributable Package (x64)] http://www.microsoft.com/downloads/details.aspx?familyid=92e0e1ce-8693-4480-84fa-7d85eef59016&displaylang=en

Also, The Universal RAID Utility uses the runtime component of the Microsoft Visual C++ 2005 SP1 library. If the runtime component of the Microsoft Visual C++ 2005 SP1 library does not exist in the computer where the Universal RAID Utility is to be installed, install the runtime component.

Step 1 Click [Start] - [Control Panel]. Then double-click [Add or Remove Program].



Step 2 Click [Change or Remove Programs] to list [Currently installed programs]. If the following program exists in the list of [Currently installed programs], the runtime component of the Microsoft Visual C++ 2005 SP1 library may not be installed.
If not, install the runtime component of the Microsoft Visual C++ 2005 SP1 library.
- [Microsoft Visual C++ 2005 Redistributable]

Step 3 For the runtime component of the Microsoft Visual C++ 2005 SP1 library, see the table below to download and install required packages.

CPU architecture	Required component and its vendor
x86/x64	[Microsoft Visual C++ 2005 SP1 Redistributable Package (x86)] http://www.microsoft.com/downloads/details.aspx?FamilyID=200b2fd9-ae1a-4a14-984d-389c36f85647&displaylang=en Use the x86 package whatever the CPU architecture may be. There is not the description about Windows Server 2008 in "System Requirements" - "Supported Operating Systems." But if you use Windows Server 2008 as the operating system, you need to install this package.

New Installation (Windows)

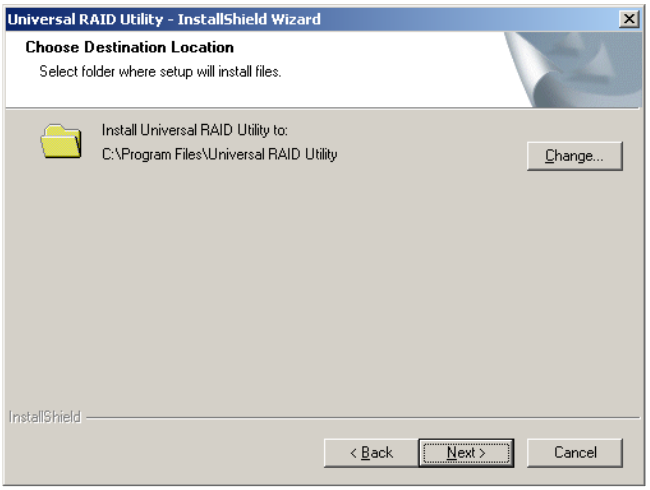
The Setup Program install Universal RAID Utility newly, when there is not Universal RAID Utility in the computer.

Step 1 Click [Start], [Run...], [Browse...]. Click setup.exe in the folder contained the installation image of Universal RAID Utility and click [Open] in the [Browse] dialog box. Recognize that displays "setup.exe" in [Name] box on [Run] dialog box and click [OK].

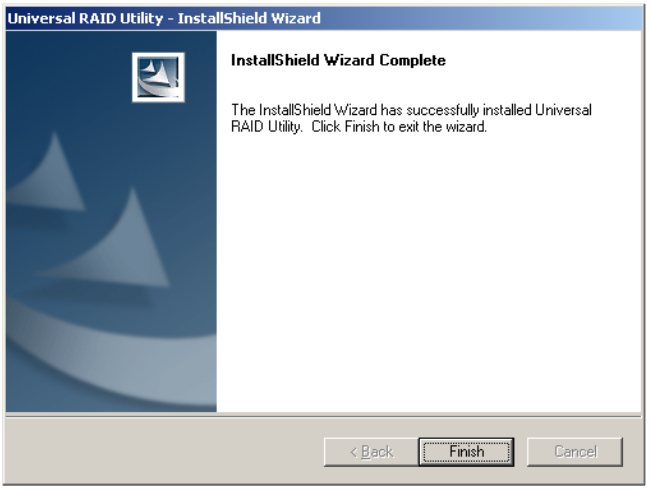
Step 2 The new installation starts the InstallShield Wizard of the Universal RAID Utility. Click [Next].

Universal RAID Utility - InstallShield Wizard
Welcome to the InstallShield Wizard for Universal RAID Utility
The InstallShield Wizard will install Universal RAID Utility on your computer. To continue, click Next.
< Back
Next >
Cancel

Step 3 The Universal RAID Utility is installed in \Program Files\Universal RAID Utility (or Program Files (x86) for x64) in the drive where the OS is started by default. To change the installation folder, click [Change] and enter another installation folder. Click [Next] to start the installation.

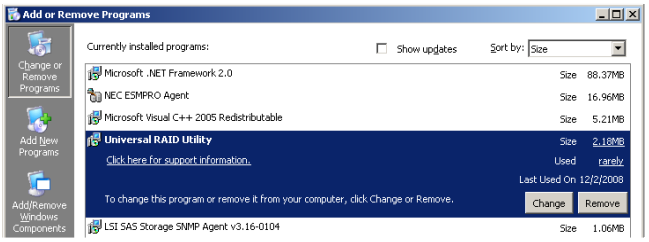


Step 4 At the completion of the installation, the wizard appears as shown in the figure to the right. Click [Finish].


Universal RAID Utility - InstallShield Wizard
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed Universal RAID Utility. Click Finish to exit the wizard.
< Back
Finish
Cancel

Step 5 If installation completes, "Universal RAID Utility" is registered to the program list in the [Change or Remove Programs].
Also, 1 or several programs to control RAID controller in your system are registered to the program list.

- LSI SAS Storage SNMP Agent *X* (*X* is version)
- WebPAMPRO Agent



IMPORTANT

- **Don't uninstall " LSI SAS Storage SNMP Agent *X* " (*X* is version) in the list of [Add or Remove Program]. If you uninstall it, Universal RAID Utility can't use normally.**
- **Please check the setting of [When maximum log size is reached] in the [Properties] of [System] event log. In case of [When maximum log size is reached] is not [Overwrite events as needed], when log size reaches maximum size, Universal RAID Utility can not register the detected RAID event to the Windows event log and alert it to the NEC ESMPRO Manager. Please set [When maximum log size is reached] to the [Overwrite events as needed].**

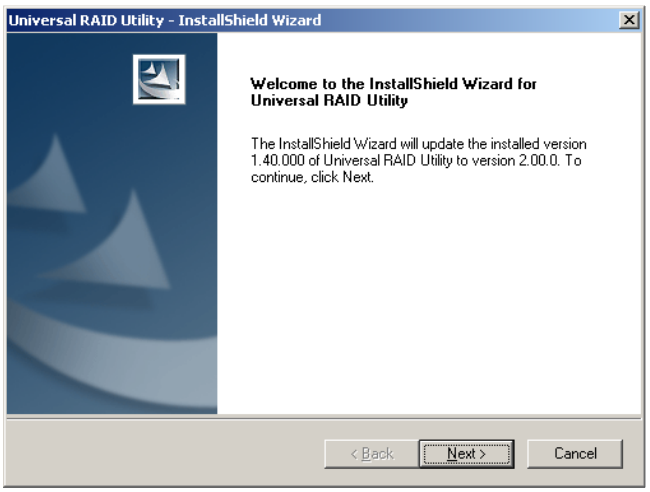
Update Installation (Windows)

The Setup Program install the new version of Universal RAID Utility, when there is the old version of Universal RAID Utility in the computer. The Setup Program use the following setting continuously.

- Installation folder
- The contents of RAID log
- TCP port using Universal RAID Utility
- The running mode of RAID Viewer and raidcmd
- The scheduled task of consistency check in task of operating system

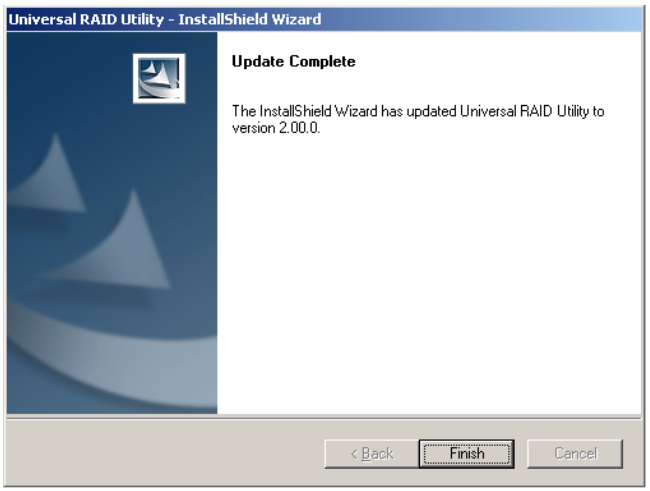
Step 1 See "New Installation (Windows)" about the procedure of start the setup program.

Step 2 The update installation starts the InstallShield Wizard of the Universal RAID Utility. Click [Next].


Universal RAID Utility - InstallShield Wizard
Welcome to the InstallShield Wizard for Universal RAID Utility
The InstallShield Wizard will update the installed version 1.40.000 of Universal RAID Utility to version 2.00.0. To continue, click Next.
< Back
Next >
Cancel

Step 3 At the completion of the installation, the wizard appears as shown in the figure to the right. Click [Finish].

You can check the result of installation by the same way with "New Installation (Windows)".



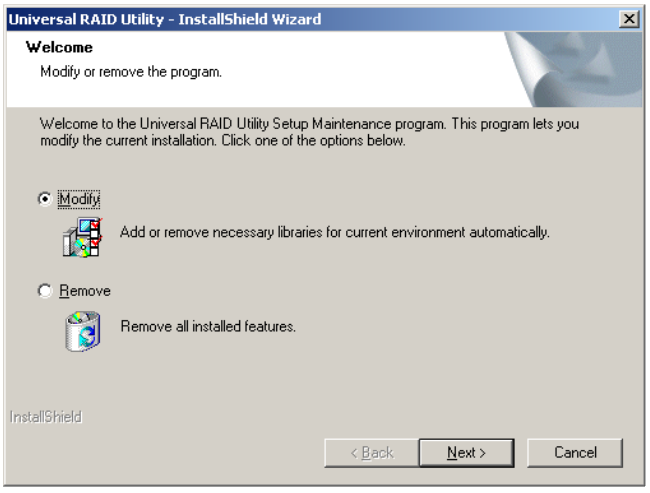
Add Installation (Windows)

The Setup Program install or uninstall the program to control the RAID Controller after added or deleted the RAID Controller.

> TIPS
>
> You can start the add installation by using the clicking [Modify] on "Universal RAID Utility" program in the list of [Add or Remove Program].

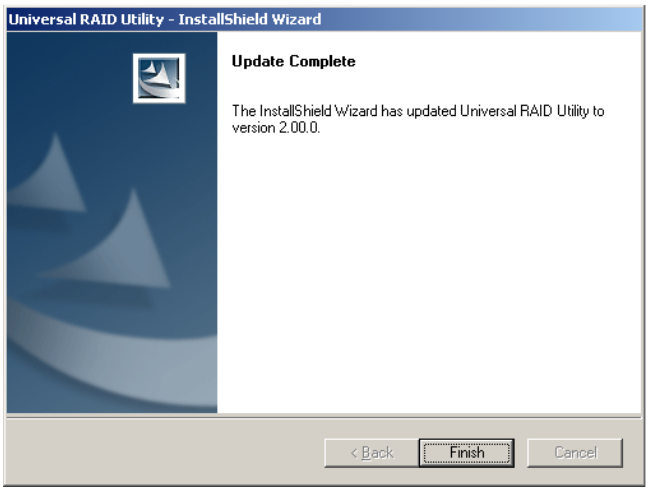
Step 1 See "New Installation (Windows)" about the procedure of start the setup program.

Step 2 The add installation starts the InstallShield Wizard of the Universal RAID Utility. Select [Modify] and click [Next].


Universal RAID Utility - InstallShield Wizard
Welcome
Modify or remove the program.
Welcome to the Universal RAID Utility Setup Maintenance program. This program lets you modify the current installation. Click one of the options below.
Modify
Add or remove necessary libraries for current environment automatically.
Remove
Remove all installed features.
InstallShield
< Back
Next >
Cancel

Step 3 At the completion of the installation, the wizard appears as shown in the figure to the right. Click [Finish].

You can check the result of installation by the same way with "New Installation (Windows)".



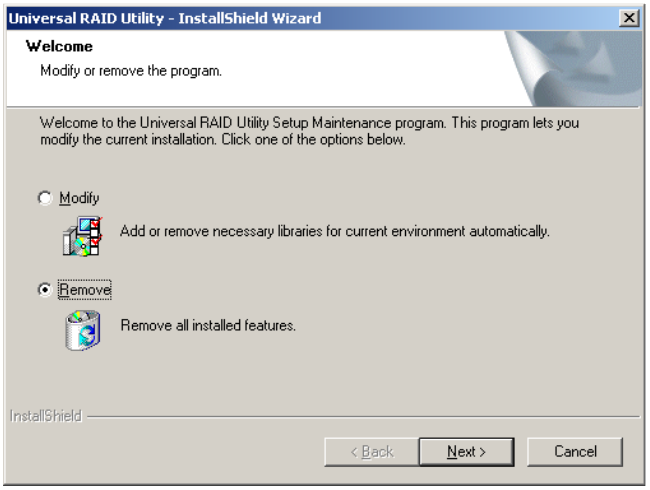
Uninstallation (Windows)

The Setup Program uninstall Universal RAID Utility, when there is the same version of Universal RAID Utility in the computer.

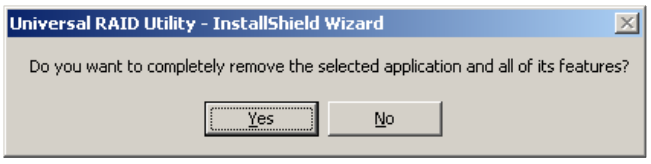
> TIPS
> You can start the uninstallation by using the clicking [Delete] on "Universal RAID Utility" program in the list of [Add or Remove Program].

Step 1 See "New Installation (Windows)" about the procedure of start the setup program.

Step 2 The uninstallation starts the InstallShield Wizard of the Universal RAID Utility. Select [Remove] and click [Next].


Universal RAID Utility - InstallShield Wizard
Welcome
Modify or remove the program.
Welcome to the Universal RAID Utility Setup Maintenance program. This program lets you modify the current installation. Click one of the options below.
Modify
Add or remove necessary libraries for current environment automatically.
Remove
Remove all installed features.
InstallShield
< Back
Next >
Cancel

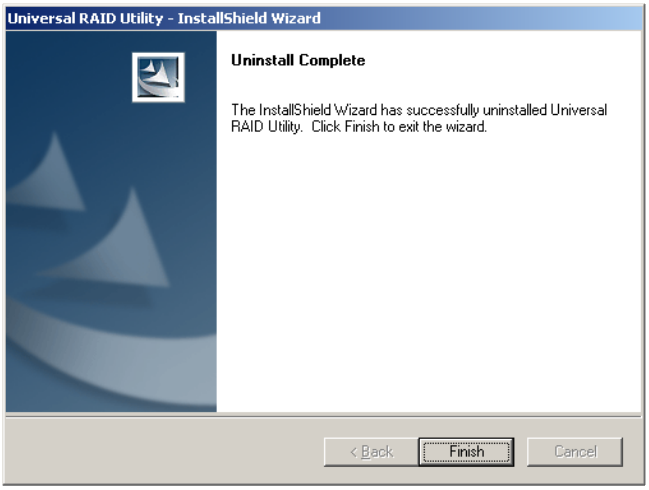
Step 3 The InstallShield Wizard of the Universal RAID Utility is started. Click [Yes] on the dialog box shown to the right to start the uninstallation. Click [No] to abort the setup program.


Universal RAID Utility - InstallShield Wizard
Do you want to completely remove the selected application and all of its features?
Yes
No

Step 4 At the completion of the uninstallation, the wizard appears as shown in the figure to the right. Click [Finish].

If the uninstallation completes, "Universal RAID Utility" is deleted from the list of [Add or Remove Program].

Also, 1 or several programs to control RAID controller in your system are deleted too.


Universal RAID Utility - InstallShield Wizard
Uninstall Complete
The InstallShield Wizard has successfully uninstalled Universal RAID Utility. Click Finish to exit the wizard.
< Back
Finish
Cancel

Preparing installation (Linux)

You must prepare the following package for using the Universal RAID Utility. If it does not exist in the computer where the Universal RAID Utility is to be installed.

- standard C++ library : libstdc++
- GCC 3.3.4 Compatibility standard C++ library : compat-libstdc++-33
- GCC library : libgcc
- cron : vixie-cron

You can recognize the existence and install these packages by the following procedure (This procedure is example using GCC 3.3.4 Compatibility standard C++ library).

Step 1 You can check by rpm command which does GCC 3.3.4 Compatibility standard C++ library exist in the computer or not. If it has existed in your computer, rpm command displays the right way (the part of "*" is different by operating system). In this case, refer to "New Installation (Linux, VMware ESX Server)". If it has not existed in your computer, rpm command displays the right way. In this case, install it to your computer.

```
> rpm -q compat-libstdc++-33      ●····· 1
compat-libstdc++-33-3.2.3-*
>
```

Step 2 Log in to the computer with administrator authority to install Universal RAID Utility.
Insert the install disk of operating system included the "GCC 3.3.4 Comparability standard C++ library" to CD-ROM/DVD-ROM drive of your computer.

Step 3 Move current directory to the directory existed GCC 3.3.4 Compatibility standard C++ library, install it by rpm command (the part of "*" is different by operating system).

```
> rpm -q compat-libstdc++-33      ●····· 2
package compat-libstdc++-33 is not installed
> rpm -ivh compat-libstdc++-33-*.i386.rpm      ●····· 3
Preparing...                ###########################################
[100%]
   1:compat-libstdc++-33    ###########################################
[100%]
> rpm -q compat-libstdc++-33
compat-libstdc++-33-3.2.3-*
>
```

Step 4 You can see the result of installation by rpm command. If the installation finishes, rpm command displays the below
compat-libstdc++-33-3.2.3-*
(the part of "*" is different by operating system)
If the installation fails, rpm command does not display this package name.

New Installation (Linux, VMware ESX Server)

Use setup.sh in the install image for the installation of Universal RAID Utility newly.

You must install the Universal RAID Utility in the ESX Server. Don't install in the virtual machine.

Step 1 Execute setup.sh in the installation image. Change the current directory to the directory in which the installation image is stored and type as follows:
sh setup.sh –install

Step 2 At the end of setup.sh, the installation is completed. Check the result of the installation by using the rpm command. When the installation is completed properly, the following packages is installed:
- UniversalRAIDUtility-1.xx-y (xx is minor version, y is revision number)
Also, 1 or several packages to control RAID controller are installed :
- storelib-2.aa-0. (aa is minor version)
- WebPAMPRO_Agent-3.aa.bbbb-cc (aa.bbbb-cc is version)
If the installation fails, these packages do not exist in the computer.

Update Installation (Linux, VMware ESX Server)

The Setup Program execute the Update Installation when there is the old version of Universal RAID Utility in the computer. The Setup Program use the following setting continuously.

- The contents of RAID log
- TCP port using Universal RAID Utility
- The running mode of raidcmd
- The scheduled task of consistency check in crontab of operating system

See "New Installation (Linux, VMware ESX Server)" about the procedure of Update Installation.

Add Installation (Linux, VMware ESX Server)

The Setup Program execute the Add Installation when there is the same version of Universal RAID Utility in the computer. In add installation, install or uninstall the program to control the RAID Controller after added or deleted the RAID Controller.

See "New Installation (Linux, VMware ESX Server)" about the procedure of Update Installation.

Uninstallation (Linux, VMware ESX Server)

Use setup.sh in the install image for the uninstallation of Universal RAID Utility.

Step 1 Execute setup.sh in the installation image. Change the current directory to the directory in which the installation image is stored and type as follows:
sh setup.sh –uninstall

> cd directory name involved install image
> sh setup.sh --uninstall
1
> rpm -q UniversalRaidUtility
error: package UniversalRaidUtility is not installed
> rpm -q storelib
2
error: package storelib is not installed
> rpm -q WebPAMPRO_Agent
error: package WebPAMPRO_Agent is not installed
>

Step 2 At the end of setup.sh, the uninstallation is completed. Check the result of the uninstallation by using the rpm command. When the uninstallation is completed properly, the following package is uninstalled:
- UniversalRaidUtility-1.xx-y (xx is minor version, y is revision number)
Also, 1 or several packages to control RAID controller are uninstalled too.

Starting or Stopping Universal RAID Utility

This chapter describes the procedure of starting or stopping each module in the Universal RAID Utility.

raidsrv service

The raidsrv service is started automatically when your computer is booted and stopped automatically when your computer is shut down.
Without operation of the raidsrv service, the Universal RAID Utility cannot operate normally. Neither make the raidsrv service be not started nor stop the raidsrv service.

> **IMPORTANT**
>
> **In case of the operating system is Linux or VMware ESX Server, if the raidsrv service terminates abnormally due to occurrence of an error or a process of the raidsrv service is terminated forcibly, the lock file for avoiding double starts is left. If the state remains, the raidsrv service may not be started.**
>
> **If this occurs, delete the following file before restarting the raidsrv service:**
> **/var/lock/subsys/raidsrv**

Starting Universal RAID Utility in Single User Mode

The Universal RAID Utility uses network functions. Accordingly, the Universal RAID Utility cannot be used in the single user mode of Linux and VMware ESX Server without network functions. To use the Universal RAID Utility in the single user mode, first enable the network functions in the following procedure and start the raidsrv service.

Step 1 Start the network service.

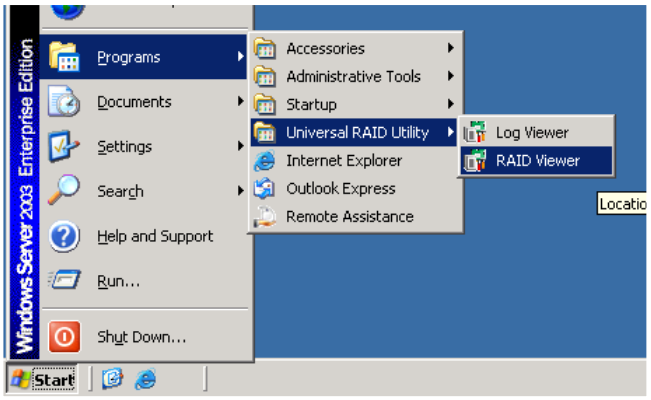
Step 2 Start the raidsrv service.

Step 3 Check that the raidsrv service is started normally. If a process ID appears, the raidsrv service is started normally.

RAID Viewer

Use [Start] menu to open the RAID Viewer.

Click [Start], and point menu in order to [Programs], [Universal RAID Utility] and [RAID Viewer].



IMPORTANT

- **To use the RAID Viewer, you should log on to the computer as a user having the administrator authority. Only users having the administrator authority can execute the RAID Viewer.**
- **When start the RAID Viewer on the computer not connected to internet, may wait a few minutes until startup the RAID Viewer. See "Verification authenticode signature when startup the RAID Viewer and Log Viewer" for detail.**

CHECK

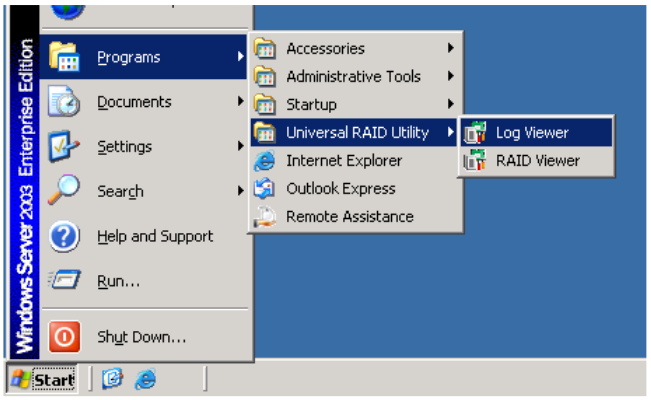
- Only a single RAID Viewer can be started at a time.
- The RAID Viewer cannot be started if the raidsrv service does not operate. An error may occur if the RAID Viewer is started just after the start of the OS. It is because the raidsrv service has not been started completely. In this case, wait for a while before restarting the RAID Viewer.

To close the RAID Viewer, select [File] on the Menu Bar of the RAID Viewer and click [Exit].

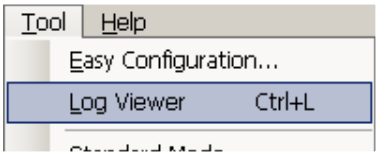
Log Viewer

Use [Start] menu to open the Log Viewer.

Click [Start], and point menu in order to [Programs], [Universal RAID Utility], [Log Viewer].



Or select [Tool] menu of the RAID Viewer and click [Log Viewer].



IMPORTANT

- **To use the Log Viewer, you should log on to the computer as a user having the administrator authority. Only users having the administrator authority can execute the Log Viewer.**
- **When start the Log Viewer on the computer not connected to internet, may wait a few minutes until startup the Log Viewer. See "Verification authenticode signature when startup the RAID Viewer and Log Viewer" for detail.**

CHECK

Only a single Log Viewer can be started at a time.

To close the Log Viewer, select [File] on the Menu Bar of the Log Viewer and click [Exit].

raidcmd

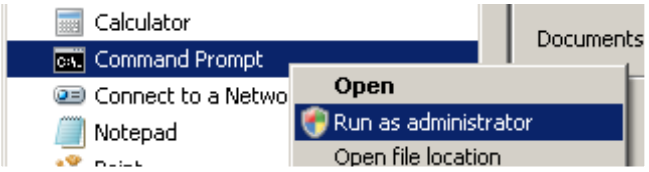
raidcmd is command on console as "Command Prompt" in Windows and console(terminal) in Linux and VMware ESX Server. The raidcmd is executed on a console. Use the raidcmd by the methods described in "Functions of raidcmd".

IMPORTANT

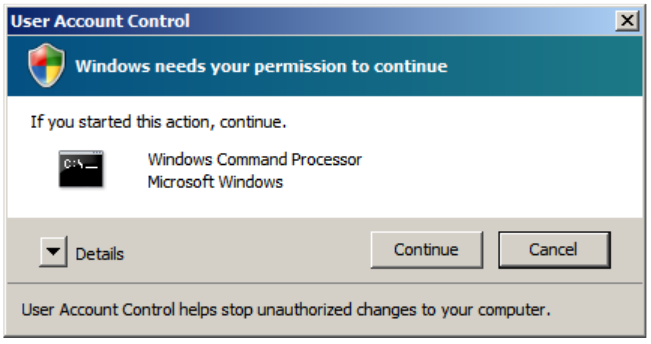
- **A user having the administrator authority should run the raidcmd. Only users having the administrator authority can execute the raidcmd.**
- **In case of the operating system is Windows 2000, you must to restart the Command Prompt after New/Update installation.**
- **In case of the operating system is Linux or VMware ESX Server, the raidcmd can't start by existing the lock file after aborted it. If you start the raidcmd when the lock file exists, the raidcmd displays the following message.**
  raidcmd:<RU4009> The raidcmd command is already running.
  Delete the lock file (/var/lock/subsys/raidcmd), if the raidcmd displays this message when some processes of the raidcmd don't execute at same time,

In case of the operating system is Windows Server 2008 or Windows Vista, you must use "[Administrator: Command Prompt]" for running raidcmd. If you use normal Command Prompt, you can not see the message of raidcmd because of raidcmd runs in the another "[Administrator: Command Prompt]" . You can use "[Administrator: Command Prompt]" by the following procedure.

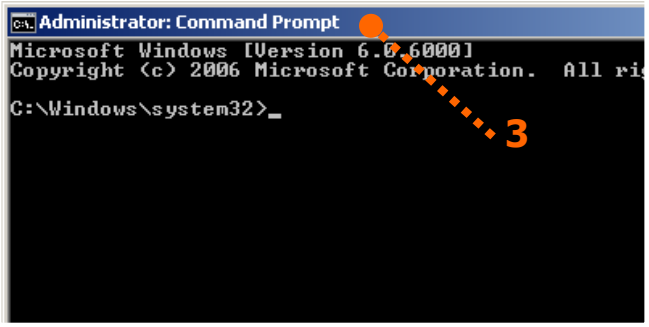
Step 1 Click [Start] menu, and point menu in order to [Programs], [Accessories], [Command Prompt], click [Run as administrator] on shortcut menu.



Step 2 The operating system may display [User Account Control] dialog box after clicked [Run as Administrator]. If you want to run the raidcmd, click [Continue].



Step 3 [Administrator: Command Prompt] will start soon. You should check the window title is "[Administrator: Command Prompt]". You can use raidcmd on [Administrator: Command Prompt].



Standard and Advanced Modes

The RAID Viewer and raidcmd can operate in two running modes, which are Standard Mode and Advanced Modes.
The Standard Mode provides the RAID Viewer and raidcmd with standard management functions for RAID Systems.
The Advanced Mode provides the RAID Viewer and raidcmd with advanced management and maintenance functions for RAID Systems.
Using the two running modes appropriately depending on users and jobs allows the usability of the RAID Viewer to be improved and malfunctions to be avoided.
The table below lists the functions of the RAID Viewer and raidcmd available in each mode.

Function	RAID Viewer function	raidcmd command	Standard mode	Advanced mode
Update display information	Rescan	NA	✓	✓
See property	Property	property	✓	✓
Create Logical Drive (simple)	Create Logical Drive (Simple)	mklds	✓	✓
Create Logical Drive (custom)	Create Logical Drive (Custom)	mkldc		✓
Silence Buzzer	Silence Buzzer	sbuzzer	✓	✓
Consistency Check (start)	Consistency Check	cc	✓	✓
Consistency Check (stop)	[Stop] on Operation View	cc	✓	✓
Consistency Check (start) for schedule running	NA	ccs	✓	✓
Initialization (start)	Initialize	init		✓
Initialization (stop)	[Stop] on Operation View	init		✓
Delete Logical Drive	Delete Logical Drive	delld		✓
Rebuild (start)	Rebuild	rebuild		✓
Rebuild (stop)	[Stop] on Operation View	rebuild		✓
Hot Spare (make)	Make Hot Spare	hotspare	✓	✓
Hot Spare (remove)	Remove Hot Spare	hotspare	✓	✓
Change Status of Physical Device (Online)	Make Online	stspd		✓
Change Status of Physical Device (Failed)	Make Offline	stspd		✓
Location of Physical Device	Locate (Lamp)	slotlamp	✓	✓
Easy Configuration	Easy Configuration	econfig	✓	✓
Start Log Viewer	Log Viewer	NA	✓	✓
Change running mode	Standard Mode Advanced Mode	runmode	✓	✓
See the version	About... in [Help] menu	run raidcmd without command	✓	✓
See status of operation	Operation View	oplist	✓	✓
Set option parameters of RAID Controller	Property of RAID Controller	optctrl		✓
Set option parameters of Logical Drive	Property of Logical Drive	optld		✓
Functions other than above			✓	✓

Running Mode when startup RAID Viewer and raidcmd

RAID Viewer

RAID Viewer always starts with Standard Mode. You can change the running mode when RAID Viewer starts. See "Changing Running Mode at Start of RAID Viewer".

raidcmd

raidcmd starts with Standard Mode at first after installing Universal RAID Utility. If you want to change the running mode, you must to use "**rescan**" command (The running mode doesn't change the mode when restart the computer).

Changing Running Mode

The procedure of changing the running mode is below.

RAID Viewer

Use [Advanced] or [Standard] in [Tool] menu.

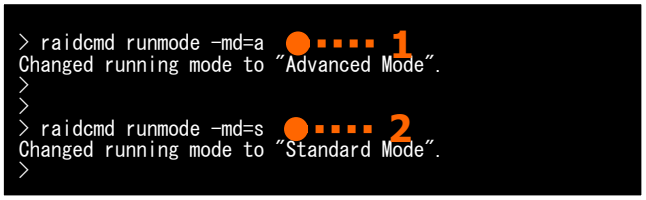
See "[Tool] menu" for detail.

raidcmd

Use "**runmode**" command.

Step 1 If you want to change from Standard Mode to Advanced Mode, run "**runmode**" command with -md=a parameter.

Step 2 If you want to change from Advanced Mode to Standard Mode, run "**runmode**" command with -md=s parameter.



Functions of RAID Viewer

This chapter describes the functions of the RAID Viewer.

Structure of RAID Viewer

As shown in the figure below, the RAID Viewer is composed of four parts, or Tree View, Operation View, Menu Bar and Status Bar.

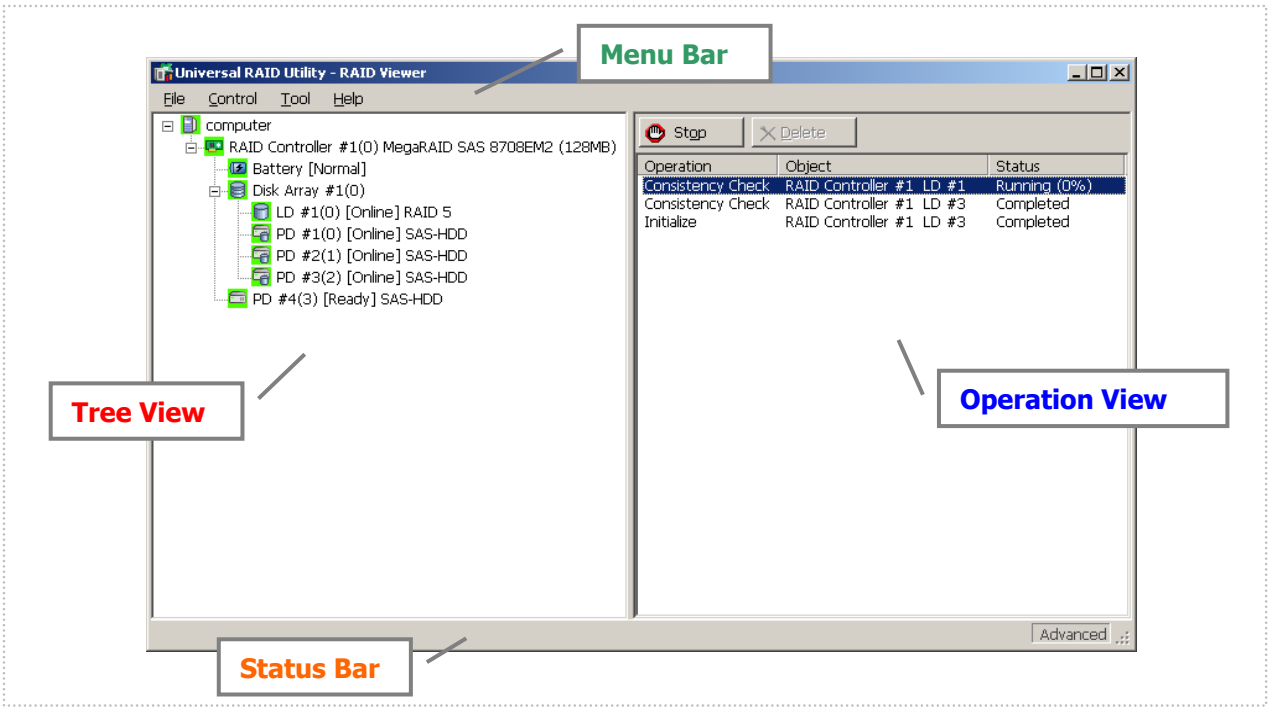
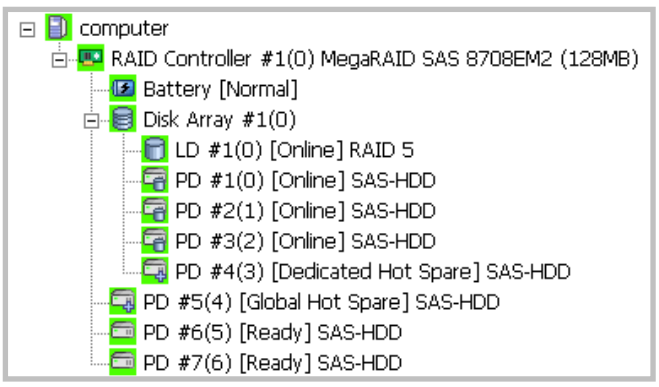


Figure 2 Structure of RAID Viewer

Tree View

The Tree View indicates the configuration of RAID Systems managed by the Universal RAID Utility existing in your computer hierarchically. The Tree View also indicates the types and status of components with relevant icons.

The Tree View displays each RAID System existing in your computer as a RAID Controller node.
Each RAID Controller node has the node of a battery on RAID Controller, created all Logical Drives and Disk Array and connected all Physical Devices. A single node includes at least a single component of each type.
Every component is accompanied by an icon. The icons indicate the type and the status of each component (computer, RAID Controller, Battery, Logical Drive, and Physical Device) graphically.


computer
RAID Controller #1(0) MegaRAID SAS 8708EM2 (128MB)
Battery [Normal]
Disk Array #1(0)
LD #1(0) [Online] RAID 5
PD #1(0) [Online] SAS-HDD
PD #2(1) [Online] SAS-HDD
PD #3(2) [Online] SAS-HDD
PD #4(3) [Dedicated Hot Spare] SAS-HDD
PD #5(4) [Global Hot Spare] SAS-HDD
PD #6(5) [Ready] SAS-HDD
PD #7(6) [Ready] SAS-HDD

Computer

The first level node shows the computer in which the Universal RAID Utility operates.
The computer icon indicates the status of the RAID Systems existing in the computer totally.

Icon	Meaning	Description
	Computer - Normal	All RAID Systems in the computer operate normally. Problems which RAID Controllers define as failures do not occur.
	Computer - Warning	One or more RAID Systems of the following status exist in the computer: "Containing one or more failed components but being operable"
	Computer - Fatal	One or more RAID Systems of the following status exist in the computer: "Containing one or more failed components and being inoperable"

RAID Controller

Each RAID System on the computer is the RAID Controller node. A RAID Controller node equals a RAID Controller, and shows the number, ID and model of the RAID Controller.
A RAID Controller icon indicates the status of the RAID system on the RAID Controller totally.

Icon	Meaning	Description
	RAID Controller - Normal	The all of components(battery, Logical Drive, Physical Device) operates normally on the RAID Controller. Problems which the RAID Controller detects as failures do not occur.
	RAID Controller - Warning	One or more components of the following status exist on the RAID Controller : "Containing one or more failed components but being operable"
	RAID Controller - Fatal	One or more components of the following status exist in the RAID Controller : "Containing one or more failed components and being inoperable"

Battery

If the RAID Controller has the battery, the RAID Controller node has a Battery node. A Battery node and icon shows the status of battery.

Icon	Meaning	Description
	Battery - Normal	The battery operates normally.
	Battery - Warning	The RAID controller detects any problem of the battery.

Disk Array

If there are some Logical Drive in the RAID Controller, the RAID Controller node has the Disk Array nodes included the Logical Drives. The Disk Array node equals a Disk Array, and shows the number and ID of the Disk Array. Also, the created some Logical Drives, consisted of all Physical Devices and created some Dedicated Hot Spares exist in the Disk Array node. A Disk Array icon indicates the status of these totally.

Icon	Meaning	Description
	Disk Array - Normal	The created all Logical Drives, consisted of all Physical Devices and created all Dedicated Hot Spares operates normally. Problems which the RAID Controller detects as failures do not occur.
	Disk Array - Warning	These are some components which the status is Warning.

	Disk Array - Fatal	These are some components which the status is Fatal or Warning.

Logical Drive

The Logical Drive node exists in the Disk Array node. A Logical Drive node equals a Logical Drive, and shows the number, ID, status and RAID Level of the Logical Drive. A Logical Drive icon indicates the status of the Logical Drive.

Icon	Meaning	Description
	Logical Drive - Normal	The Logical Drive operates normally.
	Logical Drive - Warning	Because the Logical Drive contains one or more Physical Devices with [Status] being [Failed], the redundancy of the Logical Drive is lost or degraded.
	Logical Drive - Fatal	Because the Logical Drive contains one or more Physical Devices with [Status] being [Failed], the Logical Drive is offline and accessing to the Logical Drive is disabled.

CHECK

A Logical Drive is created by two or more Disk Arrays according to the kind of the RAID Controller. In this case, there are the nodes of a Logical Drive exist in two of more the nodes of Disk Arrays.

Physical Device

The Physical Device node exists in either the Disk Array node or the RAID Controller node. The Physical Device which has created the Logical Drive and created Dedicated Hot Spare exists in the Disk Array node. The other Physical Device exists in RAID Controller node. The Physical Device node equals a Physical Device, and shows the number, ID, status and device type of the Physical Device.
A Physical Device icon indicates the device type and the status of the Physical Device.

Icon	Meaning	Description
	Physical Device - Ready	The Physical Device is not used to create a Logical Drive yet.
	Physical Device - Online	The Physical Device is already used to create a Logical Drive. Problems which the RAID Controller detects as failures do not occur.
	Physical Device - Hot Spare	The Physical Device is registered as a Hot Spare.
	Physical Device - Rebuilding	The Physical Device which is rebuilding now.
	Physical Device - Warning	The Physical Device which detects one or more S.M.A.R.T. errors.
	Physical Device - Fatal	The Physical Device which is detected a failure by RAID Controller.
	Tape Drive	The Physical Device which device type is [Tape Drive].
	CD Drive/DVD Drive	The Physical Device which device type is [CD/DVD].

CHECK

The nodes of Dedicated Hot Spare created to two or more Disk Arrays existed in each node of Disk Array.

Shortcut Menu

Right-clicking the node of RAID Controller, Disk Array, Logical Drive, Physical Device and Battery allows the shortcut menu to appear. On the shortcut menu, you can display the property and execute the something operation. See "Menu Bar" for detail of each function.

Operation View

The Operation View indicates the status and results of operations executed in the computer after the RAID Viewer is started.

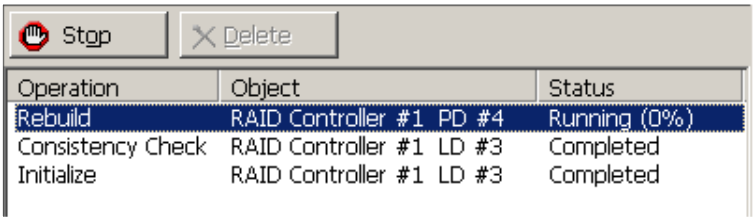


Figure 3 Operation View

The following operations may appear on the Operation View. For each operation, the target component and the status of the operation appear.

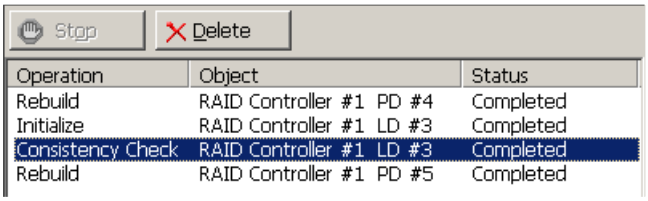
- Initialize
- Rebuild
- Consistency Check

Operations being executed while the RAID Viewer is started and those started after the RAID Viewer is started are listed.
You can see the status and result of operations by the value of [Status].

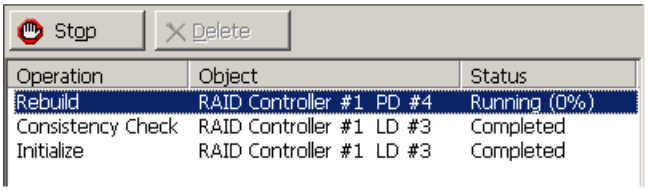
Status	Description
Running (N %)	The operation is be running (N is progress).
Completed	The operation completed.
Failed	The operation failed.
Stopped	The operation stopped (by [Stop]).
Paused (N %)	The operation is paused (N is progress).
Queued	The operation is queued.
Stop Processing	The operation is processing [Stop].

Terminated operations continue to appear until the RAID Viewer is closed. However, the terminated operations will not appear at the next start of the RAID Viewer.

To delete an operation terminated while the RAID Viewer is started, click the operation to be deleted and [Delete].



An operation being executed can be stopped on the way. To do this, click the operation to be stopped and [Stop].



CHECK

Operations allowed to be stopped vary depending on running modes. See "Standard and Advanced Modes" for details.

Menu Bar

The RAID Viewer has four menu items on the Menu Bar, or [File], [Control], [Tool] and [Help].

Figure 4 Menu of RAID Viewer

The following describes the menu items.

IMPORTANT

- **With the running mode of the RAID Viewer being "Standard", the functions unavailable in the Standard Mode do not appear on the pull-down menus of the menu items.**
- **Depending on the type or status of the target component selected on the Tree View, some menu items cannot be executed. If so, clicking such a menu item is disabled.**

[File] menu

[File] menu includes items for updating the display information on the RAID Viewer, displaying the property of each component, and terminating the RAID Viewer.

Menu item	Description
[Rescan]	The Universal RAID Utility acquires the configuration and state information from all of RAID system again, and updates the management information by them. The RAID Viewer displays the newest information.
[Properties...]	Indicates the property of the component selected on the Tree View (RAID Controller, Logical Drive or Physical Device).
[Exit]	Closes the RAID Viewer.

[Control] menu

[Control] menu includes items for operating RAID Controllers, Logical Drives, and Physical Devices. To use a function subordinate to [Control] menu, first click the target component on the Tree View and select the menu item to be executed from the pull-down menu.
Some functions of [Control] menu may be disabled depending on the type or status of the selected component. (The figure shown to the right shows a sample pull-down menu of [Control] menu displayed by clicking a RAID Controller on the Tree View and selecting [Control] while the RAID Viewer is executed in the Advanced Mode.)
If the running mode of the RAID Viewer is set to the Standard Mode, the functions restricted in the Standard Mode are disabled. See "Standard and Advanced Modes" for the functions available depending on running modes.

Functions executable by RAID Controller

Menu item	Description
[Create Logical Drive]	Creates a Logical Drive in the selected RAID Controller. [Create Logical Drive] has two modes, [Simple] and [Custom]. In the [Simple] mode, a Logical Drive can be simply created only by selecting a RAID Level and Physical Devices. In the [Custom] mode, a Logical Drive can be created by specifying detailed settings.
[Silence Buzzer]	Stops the Buzzer in the RAID Controller.

Functions executable for Logical Drive

Menu item	Description
[Consistency Check]	Executes Consistency Check for the selected Logical Drive.
[Initialize]	Initializes the selected Logical Drive. [Initialize] has two modes, [Full] and [Quick]. In the [Full] mode, initializes the entire area of a Logical Drive. In the [Quick] mode, initializes only several leading blocks including the information on managing a Logical Drive.
[Delete Logical Drive]	Deletes the selected Logical Drive.

Functions executable for Physical Device

Menu item	Description
[Rebuild]	Rebuilds the selected Physical Device.
[Hot Spare]	Makes a Hot Spare with the selected Physical Device or removes a Hot Spare. [Make Global Hot Spare] makes Physical Devices be Global Hot Spares available as Hot Spares of all Logical Drives in the relevant RAID System. [Make Dedicated Hot Spare] makes Physical Devices be Dedicated Hot Spares available as Hot Spares of specific Logical Drives. [Remove Hot Spare] removes Physical Devices from Hot Spares.
[Make Online]	Sets the status of the selected Physical Device to online.
[Make Offline]	Sets the status of the selected Physical Device to offline.
[Locate(Lamp)]	Goes on (or blinks) the lamp on the slot where the selected Logical Drive is installed. [ON] goes on the lamp. [OFF] goes off the lamp.

[Tool] menu

[Tool] menu includes tools used to manage RAID Systems and items for changing the operation of the RAID Viewer.

Menu item	Description
[Easy Configuration...]	Executes Easy Configuration allowing a RAID System to be configured easily.
[Log Viewer]	Starts the Log Viewer.
[Advanced Mode] or [Standard Mode]	Alters the running mode. The item varies depending on the running mode. [Advanced Mode] sets the running mode to the Advanced Mode. [Standard Mode] sets the running mode to the Standard Mode.
[Option...]	Allows you to provide settings for the Universal RAID Utility.

[Help] menu

[Help] menu includes the item of indicating the version and revision of the Universal RAID Utility and the version of the RAID Viewer.

Menu item	Description
[About...]	Indicates the version and revision of the Universal RAID Utility and the version of the RAID Viewer.

Status Bar

The Status Bar indicates the current running mode of the RAID Viewer.

Figure 5 Status Bar of RAID Viewer

Functions of Log Viewer

This chapter describes the functions of the Log Viewer.

Structure of Log Viewer

As shown in the figure below, the Log Viewer is composed of three parts, or Log View, Menu Bar and Status Bar.

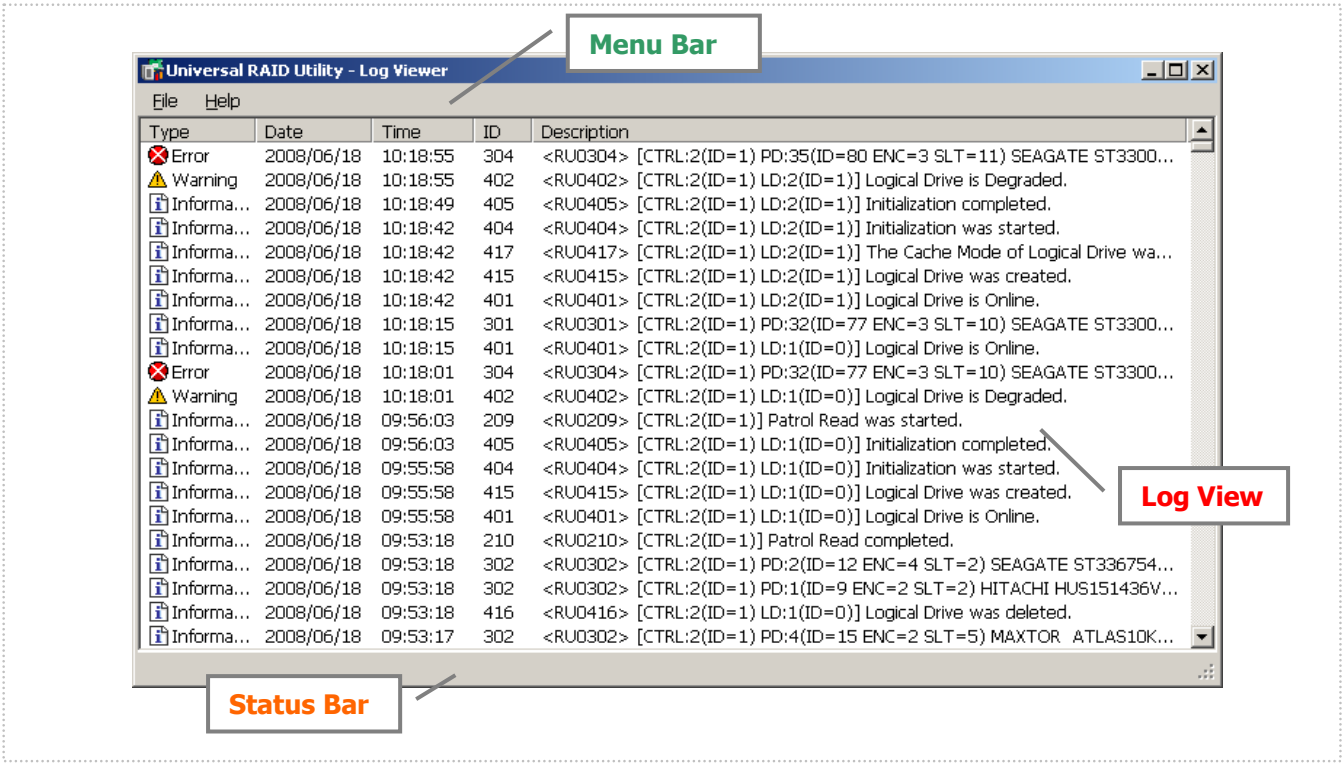

Menu Bar
Universal RAID Utility - Log Viewer
File Help
Type Date Time ID Description
Error 2008/06/18 10:18:55 304 <RU0304> [CTRL:2(ID=1) PD:35(ID=80 ENC=3 SLT=11) SEAGATE ST3300...
Warning 2008/06/18 10:18:55 402 <RU0402> [CTRL:2(ID=1) LD:2(ID=1)] Logical Drive is Degraded.
Informa... 2008/06/18 10:18:49 405 <RU0405> [CTRL:2(ID=1) LD:2(ID=1)] Initialization completed.
Informa... 2008/06/18 10:18:42 404 <RU0404> [CTRL:2(ID=1) LD:2(ID=1)] Initialization was started.
Informa... 2008/06/18 10:18:42 417 <RU0417> [CTRL:2(ID=1) LD:2(ID=1)] The Cache Mode of Logical Drive wa...
Informa... 2008/06/18 10:18:42 415 <RU0415> [CTRL:2(ID=1) LD:2(ID=1)] Logical Drive was created.
Informa... 2008/06/18 10:18:42 401 <RU0401> [CTRL:2(ID=1) LD:2(ID=1)] Logical Drive is Online.
Informa... 2008/06/18 10:18:15 301 <RU0301> [CTRL:2(ID=1) PD:32(ID=77 ENC=3 SLT=10) SEAGATE ST3300...
Informa... 2008/06/18 10:18:15 401 <RU0401> [CTRL:2(ID=1) LD:1(ID=0)] Logical Drive is Online.
Error 2008/06/18 10:18:01 304 <RU0304> [CTRL:2(ID=1) PD:32(ID=77 ENC=3 SLT=10) SEAGATE ST3300...
Warning 2008/06/18 10:18:01 402 <RU0402> [CTRL:2(ID=1) LD:1(ID=0)] Logical Drive is Degraded.
Informa... 2008/06/18 09:56:03 209 <RU0209> [CTRL:2(ID=1)] Patrol Read was started.
Informa... 2008/06/18 09:56:03 405 <RU0405> [CTRL:2(ID=1) LD:1(ID=0)] Initialization completed.
Informa... 2008/06/18 09:55:58 404 <RU0404> [CTRL:2(ID=1) LD:1(ID=0)] Initialization was started.
Informa... 2008/06/18 09:55:58 415 <RU0415> [CTRL:2(ID=1) LD:1(ID=0)] Logical Drive was created.
Informa... 2008/06/18 09:55:58 401 <RU0401> [CTRL:2(ID=1) LD:1(ID=0)] Logical Drive is Online.
Informa... 2008/06/18 09:53:18 210 <RU0210> [CTRL:2(ID=1)] Patrol Read completed.
Informa... 2008/06/18 09:53:18 302 <RU0302> [CTRL:2(ID=1) PD:2(ID=12 ENC=4 SLT=2) SEAGATE ST336754...
Informa... 2008/06/18 09:53:18 302 <RU0302> [CTRL:2(ID=1) PD:1(ID=9 ENC=2 SLT=2) HITACHI HUS151436V...
Informa... 2008/06/18 09:53:18 416 <RU0416> [CTRL:2(ID=1) LD:1(ID=0)] Logical Drive was deleted.
Informa... 2008/06/18 09:53:17 302 <RU0302> [CTRL:2(ID=1) PD:4(ID=15 ENC=2 SLT=5) MAXTOR ATLAS10K...
Log View
Status Bar

Figure 6 Structure of Log Viewer

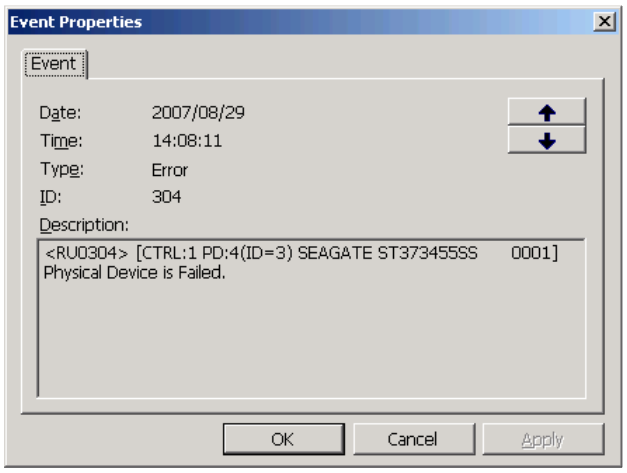
The Status Bar is used only for changing the size of the Log Viewer window.

Log View

The Log View indicates RAID System operation logs logged by the raidsrv service.
You can view the following information on the Log View.

Item	Description
Type	Logs are classified into three types as follows: Fatal: A log of the type is registered when a fatal error occurs. Warning: A log of the type is registered when a problem occurs which is not fatal but requires your attention. Information: A log of the type is registered at occurrence of an event such as execution of an operation without any problem.
Date	Indicates the date on which the event occurred.
Time	Indicates the time at which the event occurred in the 24-hour format.
Event ID	Indicates the event ID of the log.
Description	Indicates the contents of the log.

Double-clicking an arbitrary log allows the detailed information on the log to be displayed.



Menu Bar

The Log Viewer has two menu items, or [File] and [Help] on the Menu Bar.

Figure 7 Menu of Log Viewer

The following describes each menu item.

[File] menu

[File] menu includes items for updating the display information on the Log Viewer and terminating the Log Viewer.

Menu item	Description
[Refresh]	Reads the contents in the RAID Log and updates the Log View to the latest.
[Properties...]	Opens the [Event Properties] dialog box and displays the detailed information on the log selected by the Log Viewer.
[Exit]	Closes the Log Viewer.

[Help] menu

[Help] menu includes the item of indicating the version of the Log Viewer.

Menu item	Description
[About...]	Indicates the version of the Log Viewer.

Functions of raidcmd

This chapter describes the functions of the raidcmd.

Command Line

To use the raidcmd, specify a command and one or more parameters for the command if necessary.

```
> raidcmd command <parameters of command>
```

To use the raidcmd, you should log in to the computer as a user having the administrator authority. Only users having the administrator authority can execute the raidcmd.

Executing the raidcmd without any command and its parameters indicates the version of the raidcmd.

Returned Value from raidcmd

The returned value of the raidcmd is the result of executing the command.

Returned value	Execution result
0	Normal termination of command
1	Abnormal termination of command

Error Messages of raidcmd

When a command of the raidcmd terminates abnormally, the relevant error message appears in the following format:

```
> raidcmd (command) (parameters of command)
raidcmd : error message
>
```

Commands of raidcmd

See "raidcmd Command Reference" for commands of the raidcmd.
Use help command, displays the help of raidcmd.

Termination of raidcmd

In case of the operating system is Windows, raidcmd is the batch file in system folder (the batch file in system folder call raidcmd binary in the installed folder of Universal RAID Utility). Therefore, if you terminates raidcmd by CTRL + C key, the operating system displays the message as "Terminate batch job (Y/N)?". When displays this message, raidcmd binary is terminated already.

Referring to Information on RAID System

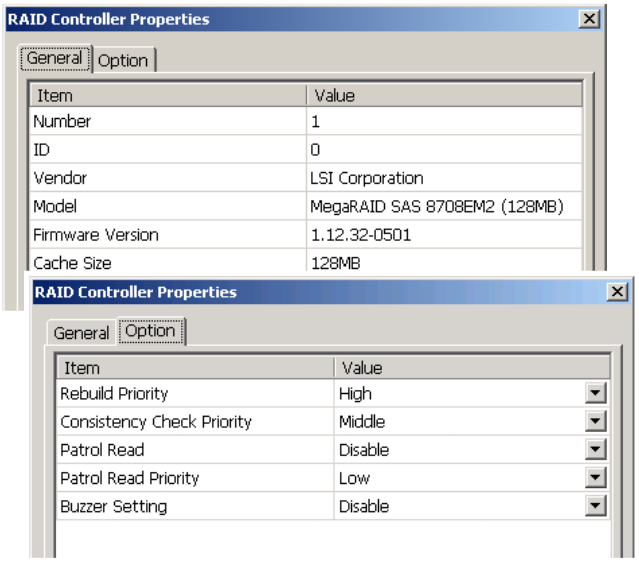
This chapter describes how to see the configurations and status of RAID Systems and the RAID System operation log.

Referring to Property of RAID Controller

For the information on a RAID Controller, see the property of the RAID Controller.

To display the property of RAID Controller by RAID Viewer, click the RAID Controller whose information is to be seen on the Tree View and click [Properties] on the pull-down menu of menu item [File].
The [RAID Controller Properties] dialog box has the [General] and [Option] tabs.
The [General] tab indicates the property of the RAID Controller.

The [Option] tab allows you to see the settings of the RAID Controller.
You can change the settings in the Advanced Mode.



Use "**property**" command to see the property of a RAID Controller by raidcmd.

```
> raidcmd property -tg=rc -c=1
RAID Controller #1
ID                          : 0
Vendor                      : LSI Corporation
Model                       : MegaRAID SAS PCI Express(TM)
ROMB
Firmware Version            : 1.12.02-0342
Cache Size                  : 128MB
Battery Status              : Normal
Rebuild Priority            : High
Consistency Check Priority  : Low
Patrol Read                 : Enable
Patrol Read Priority        : Low
Buzzer Setting              : Enable
>
```

Item RAID Viewer	Item raidcmd	Description
Number	RAID Controller #*X*	Indicates the management number (logical address) of the RAID Controller in the Universal RAID Utility. The Universal RAID Utility assigns a number beginning with 1 for each RAID Controller.
ID	ID	Indicates the original identification value of the RAID Controller. The BIOS utility of the RAID Controller uses the address of the identification value.
Vendor	Vendor	Indicates the vendor of the RAID Controller.
Model	Model	Indicates the model name of the RAID Controller.
Firmware Version	Firmware Version	Indicates the version of the RAID Controller.
Cache Size	Cache Size	Indicates the size of cache on RAID Controller in MB.

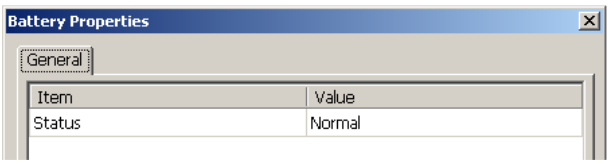
Item RAID Viewer	Item raidcmd	Description
-	Battery Status	Indicates the status of the battery installed in the RAID Controller. Three possible status are as follows: Normal: Indicates that the battery can be used normally。 Warning: Indicates that the battery cannot be used normally due to some reason. Not Present: Indicates that no battery is installed in the RAID Controller. This item is indicated by raidcmd only. You need to see the property of Battery for seeing the information of battery by RAID Viewer.
Initialize Priority	Initialize Priority	Indicates the priority level of Initialize executed in the computer system. Three possible Initialize Priorities are as follows: High: Executes Initialize at high priority. Middle: Executes Initialize at balanced priority. Low: Executes Initialize at low priority.
Rebuild Priority	Rebuild Priority	Indicates the priority level of Rebuild executed in the computer system. Three possible Rebuild Priorities are as follows: High: Executes Rebuild at high priority. Middle: Executes Rebuild at balanced priority. Low: Executes Rebuild at low priority.
Consistency Check Priority	Consistency Check Priority	Indicates the priority level of Consistency Check executed in the computer system. Three possible Consistency Check Priorities are as follows: High: Executes Consistency Check at high priority. Middle: Executes Consistency Check at balanced priority. Low: Executes Consistency Check at low priority.
Patrol Read	Patrol Read	Indicates whether Patrol Read is executed or not. Enable: Executes Patrol Read. Disable: Does not execute Patrol Read.
Patrol Read Priority	Patrol Read Priority	Indicates the priority level of Patrol Read executed in the computer system. Three possible Patrol Read Priorities are as follows: High: Executes Patrol Read at high priority. Middle: Executes Patrol Read at balanced priority. Low: Executes Patrol Read at low priority.
Buzzer Setting	Buzzer Setting	Indicates whether the Buzzer of the RAID Controller is used if a failure occurs in the RAID System. Enable: Uses the Buzzer. Disable: Does not use the Buzzer.

Some types of the RAID Controller do not support items appearing in the properties of RAID Controllers and/or items whose settings can be changed. Unsupported items indicate space or do not appear in the list.

Referring to Property of Battery

For the information on a Battery on RAID Controller, see the property of the Battery by RAID Viewer and, see the property of the RAID Controller by raidcmd.

To display the property of Battery by RAID Viewer, click the Battery whose information is to be seen on the Tree View and click [Properties] on the pull-down menu of menu item [File]. The [General] tab indicates the property of the Battery.



Item RAID Viewer	Description
Status	Indicates the status of the battery installed in the RAID Controller. Three possible status are as follows: Normal: Indicates that the battery can be used normally。 Warning: Indicates that the battery cannot be used normally due to some reason. Not Present: Indicates that no battery is installed in the RAID Controller.

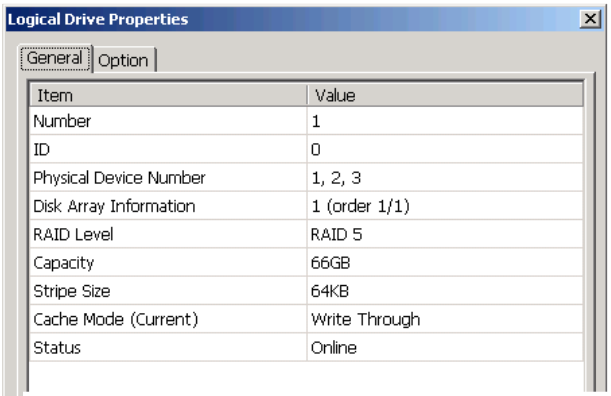
Referring to Property of Logical Drive

For the information on a Logical Drive, see the property of the Logical Drive.

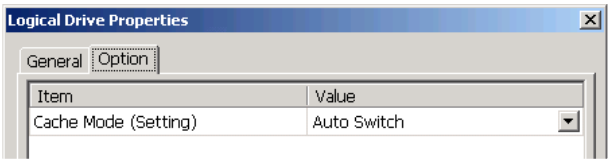
To display the property of Logical Drive by RAID Viewer, click the Logical Drive whose information is to be seen on the Tree View and click [Properties] on the pull-down menu of menu item [File].

The [Logical Drive Properties] dialog box contains the [General] and [Option] tabs.

The [General] tab indicates the property of the Logical Drive.



The [Option] tab allows you to see the settings of the Logical Drive.
You can change the settings in the Advanced Mode.



Use "**property**" command to see the property of a Logical Drive by raidcmd.

```
> raidcmd property -tg=ld -c=1 -l=1
RAID Controller #1 Logical Drive #1
ID                          : 0
Physical Device Number      : 1, 2, 3
Disk Array Information      : 1 (order 1/1)
RAID Level                  : RAID 5
Capacity                    : 20GB
Stripe Size                 : 64KB
Cache Mode (Current)        : Write Back
Cache Mode (Setting)        : Auto Switch
Status                      : Online
>
```

Item RAID Viewer	Item raidcmd	Description
Number	RAID Controller #X Logical Drive #Y	Indicates the management number (logical address) of the Logical Drive in the Universal RAID Utility. The Universal RAID Utility assigns a number beginning with 1 in correspondence with the value of [ID].
ID	ID	Indicates the original identification value of the Logical Drive. Use this value to create Logical Drives managed by the BIOS utility of the RAID Controller correspond with those managed by the Universal RAID Utility.
Physical Device Number	Physical Device Number	Indicates the numbers of Physical Devices configuring the Disk Array in which the Logical Drive exists.

Item RAID Viewer	Item raidcmd	Description
Disk Array Information	Disk Array Information	Indicates the number of the Disk Array in which the Logical Drive exists and the information on the location in the Disk Array. The information is displayed in the following format. <RAID Viewer> Disk Array number (sequence number starting from the top / sequence number of Logical Drive in Disk Array) <raidcmd> Disk Array number (order sequence number starting from the top / sequence number of Logical Drive in Disk Array)
RAID Level	RAID Level	Indicates the RAID Level of the Logical Drive. The value can be RAID 0, RAID 1, RAID 5, RAID 6, RAID 00, RAID 10, RAID 1E, RAID 50 or RAID 60.
Capacity	Capacity	Indicates the capacity of the Logical Drive in GB.
Stripe Size	Stripe Size	Indicates the Stripe Size of the Logical Drive. The value can be 1KB, 2KB, 4KB, 8KB, 16KB, 32KB, 64KB, 128KB, 256KB, 512KB, or 1024KB.
Cache Mode (Current)	Cache Mode (Current)	Indicates the current value of the mode of writing data to the cache memory installed in the RAID Controller. Three possible modes are as follows: Write Back: Writes data to the cache memory asynchronously. Write Through: Writes data to the cache memory synchronously.
Cache Mode (Setting)	Cache Mode (Setting)	Indicates the mode of writing data to the cache memory installed in the RAID Controller. Three possible modes are as follows: Auto Switch: Switches the mode automatically between Write Back and Write Through depending on the existence and/or status of battery. Write Back: Writes data to the cache memory asynchronously. Write Through: Writes data to the cache memory synchronously.
Status	Status	Indicates the status of the Logical Drive. Three possible status are as follows: Online: Indicates that the redundancy of the Logical Drive is retained. Degraded: Indicates that the redundancy of the Logical Drive is lost or degraded. Accessing to the Logical Drive is enabled. Offline: Indicates that the Logical Drive is offline and accessing to the Logical Drive is disabled.

- Each RAID Controller supports specific RAID Levels and Stripe Sizes. Unsupported items indicate space or do not appear in the list.
- Each RAID Controller supports specific Cache Modes. Unsupported Cache Modes do not appear.
- Each RAID Controller supports specific items appearing on the Property tab of the Logical Drive and specific items whose settings can be changed. Unsupported items indicate space or do not appear in the list.

The status of a Logical Drive is defined depending on the RAID Level and the number of Physical Devices failed.

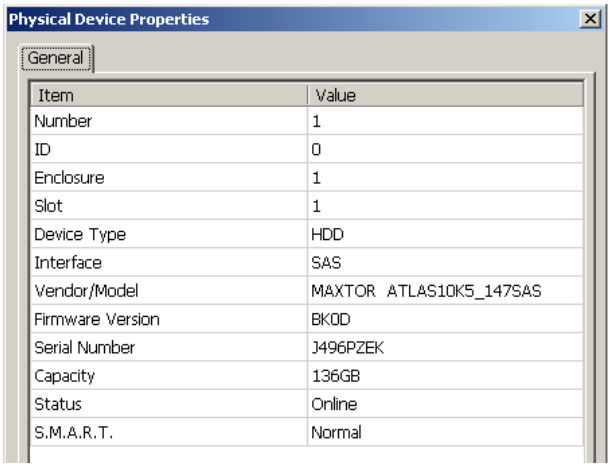
If the RAID Level is RAID 10 or RAID 50 and two Physical Devices are failed, the status will be [Degraded] or [Offline] depending on the failed Physical Devices.

Number of failed Physical Devices	0	1	2	3 or more
RAID 0	Online	Offline	Offline	Offline
RAID 1	Online	Degraded	Offline	-
RAID 5	Online	Degraded	Offline	Offline
RAID 6	Online	Degraded	Degraded	Offline
RAID 10	Online	Degraded	Degraded/Offline	Offline
RAID 50	Online	Degraded	Degraded/Offline	Offline

Referring to Property of Physical Device

For the information on a Physical Device, see the property of the Physical Device.

To display the property of Physical Device by RAID Viewer, click the Physical Device whose information is to be seen on the Tree View and click [Properties] on the pull-down menu of menu item [File].
The [General] tab indicates the property of the Physical Device.



Use "**property**" command to see the property of a physical drive by raidcmd.

```
> raidcmd property -tg=pd -c=1 -p=1
RAID Controller #1 Physical Device #1
ID                          : 0
Enclosure                   : 1
Slot                        : 1
Device Type                 : HDD
Interface                   : SAS
Vendor/Model                : SEAGATE  ST936751SS
Firmware Version            : 0001
Serial Number               : 3PE073VM
Capacity                    : 33GB
Status                      : Online
S.M.A.R.T.                  : Normal
>
```

Item RAID Viewer	Item raidcmd	Description
Number	RAID Controller #*X* Physical Device #*Y*	Indicates the management number (logical address) of the Physical Device in the Universal RAID Utility. The Universal RAID Utility arranges Physical Devices in the ascending order of IDs and assigns a number beginning with 1 sequentially to the Physical Devices.
ID	ID	Indicates the original identification value of the Physical Device. Use this value to make Physical Devices managed by the BIOS utility of the RAID Controller correspond with those managed by the Universal RAID Utility. The format of the ID varies depending on the types of RAID Controllers.

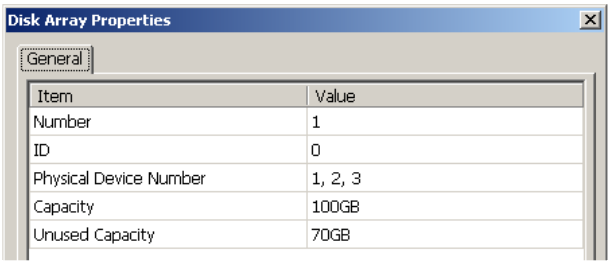
Item RAID Viewer	Item raidcmd	Description
Enclosure	Enclosure	Indicates the number of Enclosure inserted Physical Device. This value is a number beginning with 1.
Slot	Slot	Indicates the number of Slot inserted Physical Device. This value is a number beginning with 1.
Device Type	Device Type	Indicates the type of Physical Device. Four possible types are as follows: HDD : Hard Disk Drive HDD(SSD) : Solid State Drive Tape Drive : Tape Drive CD/DVD : CD drive or DVD drive
Interface	Interface	Indicates the type of the interface to which the Physical Device is connected. Two possible types are as follows: SAS : Serial Attached SCSI SATA : Serial ATA
Vendor/Model	Vendor/Model	Indicates the vendor and model name of the Physical Device.
Firmware Version	Firmware Version	Indicates the version of the Physical Device.
Serial Number	Serial Number	Indicates the serial number of the Physical Device. This item is indicated when [Device Type] item is [HDD] or [HDD(SSD)].
Capacity	Capacity	Indicates the capacity of the Physical Device in GB. This item is indicated when [Device Type] item is [HDD] or [HDD(SSD)].
Status	Status	Indicates the status of the Physical Device. Five possible status are as follows: Online: Indicates that the Physical Device is incorporated into a Logical Drive to operate normally. Failed: Indicates that the Physical Device is incorporated into a Logical Drive but is failed. Rebuilding: Indicates that the Physical Device is rebuilding. Hot Spare: Indicates that the Physical Device is set as a Hot Spare. Ready: Indicates that the Physical Device is not incorporated into a Logical Drive. This item is indicated when [Device Type] item is [HDD] or [HDD(SSD)].
Hot Spare Information	Hot Spare Information	Indicates the Hot Spare mode of the Physical Device if it is specified as a Hot Spare. Two possible modes are as follows: Global: The Physical Device can be used as a Hot Spare of any Disk Array in the RAID Controller. Dedicated: The Physical Device can be used as a Hot Spare of the specified Disk Array. Also indicates the number of the specified Disk Array. This item is indicated when [Device Type] item is [HDD] or [HDD(SSD)].
S.M.A.R.T.	S.M.A.R.T.	Indicates the diagnosis result of S.M.A.R.T.(Self-Monitoring, Analysis and Reporting Technology) function. Two possible statuses are as follows. Normal: Does not detect any error caused by the S.M.A.R.T. function. Detected: Detects one or more errors caused by the S.M.A.R.T. function. This item is indicated when [Device Type] item is [HDD] or [HDD(SSD)].

- Each RAID Controller supports specific items appearing on the Property tab of the Physical Device and specific items whose settings can be changed. Unsupported items indicate space or do not appear in the list.
- Even if Physical Device does not break down when you execute Make Offline, [Status] item is changed to [Failed].

Referring to Property of Disk Array

For the information on a Disk Array, see the property of the Disk Array.

To display the property of Disk Array by RAID Viewer, click the Disk Array whose information is to be seen on the Tree View and click [Properties] on the pull-down menu of menu item [File].
The [General] tab indicates the property of the Disk Array.



Use "**property**" command to see the property of a Disk Array by raidcmd.

```
> raidcmd property -tg=da -c=1 -a=1
RAID Controller #1 Disk Array #1
ID                          : 0
Physical Device Number      : 1, 2, 3
Capacity                    : 67GB
Unused Capacity             : 47GB
>
```

Item RAID Viewer	Item raidcmd	Description
Number	RAID Controller #*X* Disk Array #*Y*	Indicates the management number (logical address) of the Disk Array in the Universal RAID Utility.
ID	ID	Indicates the original identification value of the Disk Array. Use this value to create Disk Array managed by the BIOS utility of the RAID Controller correspond with those managed by the Universal RAID Utility.
Physical Device Number	Physical Device Number	Indicates the numbers of Physical Devices configuring the Disk Array.
Capacity	Capacity	Indicates the total capacity of Physical Device in Disk Array in GB.
Unused Capacity	Unused Capacity	Indicates the total capacity of unused area in the Disk Array in GB.

Checking Execution Status of Operation

RAID Viewer and raidcmd allows the checking execution status of operation in the RAID System.

To check the execution status of operation by RAID Viewer, use Operation View on RAID Viewer. See "Operation View" for detail.

To check the execution status of operation by raidcmd, use "**oplist**" command. The following operations are displayed by "**oplist**" command. The target components and status appear in operations:

- Initialize
- Rebuild
- Consistency Check

```
> raidcmd oplist
RAID Controller #1
Logical  Drive  #1  : Consistency Check (52%)
Logical  Drive  #2  : Initialize (33%)
Physical Device #1(0): Rebuild (99%)

RAID Controller #2
Logical  Drive  #1  : Consistency Check (2%)
Physical Device #2(1): Rebuild (22%)
>
```

The operation performed at execution of the raidcmd appears. Terminated operations do not appear. For the results of terminated operations, see the RAID Log and/or properties.

Physical Device has two numbers on oplist.
Physical Device #M(N)
M : The number of Physical Device
N : ID of Physical Device

Updating Information of RAID System

The management information of RAID System managed by the Universal RAID Utility is corrected by the raidsrv service at the following timings:

- Starting raidsrv service
- Receiving an event such as change of RAID System status or change of execution status of an operation having occurred

To update the management information of the RAID system to the latest, collect the newest information of all RAID System by the RAID Viewer and raidcmd.

RAID Viewer

Use [Rescan] in [File] menu.

Step 1 Start the RAID Viewer. Click [Rescan] in [File] menu. The raidsrv service acquires the information on the RAID System from the RAID System again and updates the management information to the latest.

raidcmd

Use "**rescan**" command.

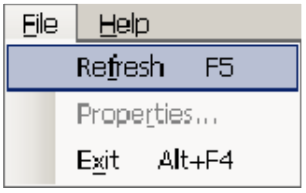
Step 1 Execute "**rescan**" command. The raidsrv service acquires the information on the RAID System from the RAID System again and updates the management information to the latest.

Referring to RAID System Operation Log

Operations done for RAID Systems and events occurred in the RAID Systems are registered to the RAID Log of the Universal RAID Utility. See "Logging Events to RAID Log" for detail.

In case of the operating system is Windows, use Log Viewer to refer to RAID Log

The information saved in the RAID Log at the start of the Log Viewer appears on it. To update the information, click [Refresh] on the pull-down menu of menu item [File]. The Log Viewer acquires the RAID Log again and updates the displayed information to the latest.



In case of the operating system is Linux, use text editor or otherwise to refer to RAID Log.

Configuration of RAID System

This chapter describes the configuration of a RAID System by using the Universal RAID Utility.

The Universal RAID Utility provides a variety of functions depending on purposes.

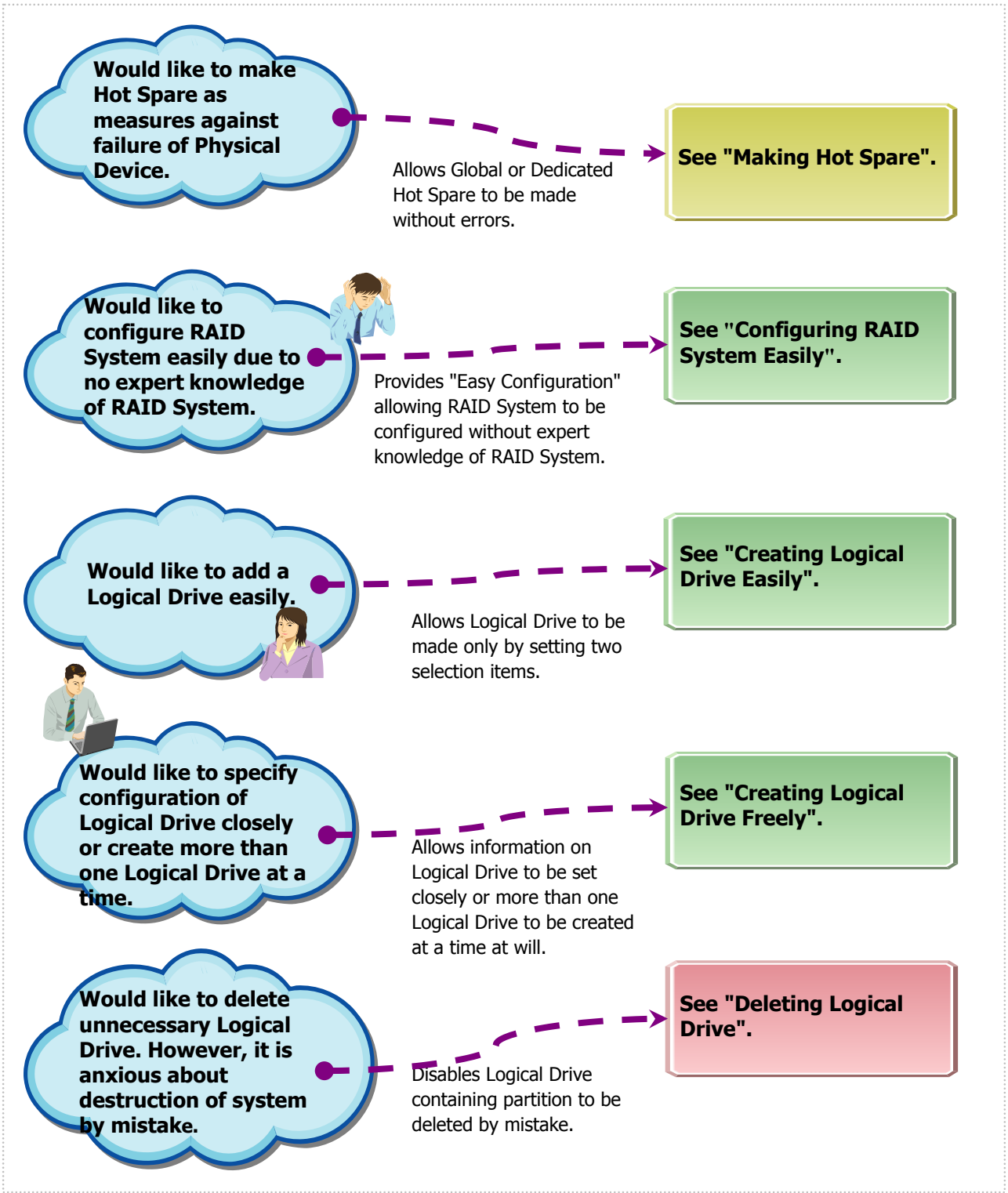

Would like to make Hot Spare as measures against failure of Physical Device.
Allows Global or Dedicated Hot Spare to be made without errors.
See "Making Hot Spare".
Would like to configure RAID System easily due to no expert knowledge of RAID System.
Provides "Easy Configuration" allowing RAID System to be configured without expert knowledge of RAID System.
See "Configuring RAID System Easily".
Would like to add a Logical Drive easily.
Allows Logical Drive to be made only by setting two selection items.
See "Creating Logical Drive Easily".
Would like to specify configuration of Logical Drive closely or create more than one Logical Drive at a time.
Allows information on Logical Drive to be set closely or more than one Logical Drive to be created at a time at will.
See "Creating Logical Drive Freely".
Would like to delete unnecessary Logical Drive. However, it is anxious about destruction of system by mistake.
Disables Logical Drive containing partition to be deleted by mistake.
See "Deleting Logical Drive".

Figure 8 RAID System configuration functions

Making Hot Spare

The Universal RAID Utility can make a Hot Spare to be replaced with a Physical Device in which a failure occurs. Hot spares can have the following two modes.

Mode	Description
Global (Hot Spare)	Available as a Hot Spare of every Disk Array for a single RAID Controller.
Dedicated (Hot Spare)	Available as a Hot Spare of a specific Disk Array for a single RAID Controller.

In either mode, note the following to have a Hot Spare operate normally.

- A Hot Spare can operate properly only for a Disk Array configured with Physical Devices of the same interface type and the same device type.
- A Hot Spare can operate properly only if the Hot Spare has the capacity equal to or larger than that of the Physical Device in which a failure occurs.
- A Physical Device in which a S.M.A.R.T. error is detected cannot be used as a Hot Spare.

About Global Hot Spare

Global Hot Spare is a Hot Spare of every Logical Drives for a single RAID Controller.

Ex.1 : If you make the Global Hot Spare on the RAID Controller which has Logical Drive #1 and #2, the Global Hot Spare is a Hot Spare of Logical Drive #1 and #2.

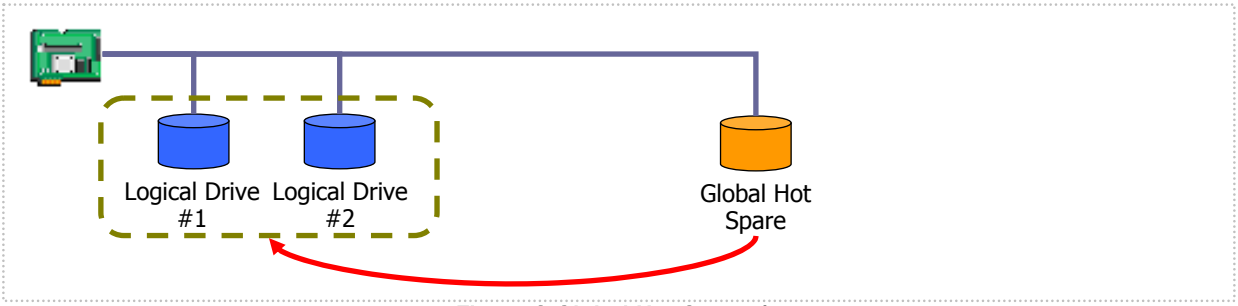


Figure 9 Global Hot Spare 1

Ex.2 : If you create the Logical Drive #3 on the RAID System of Ex.1, the Global Hot Spare is a Hot Spare for the Logical Drive #3 too.

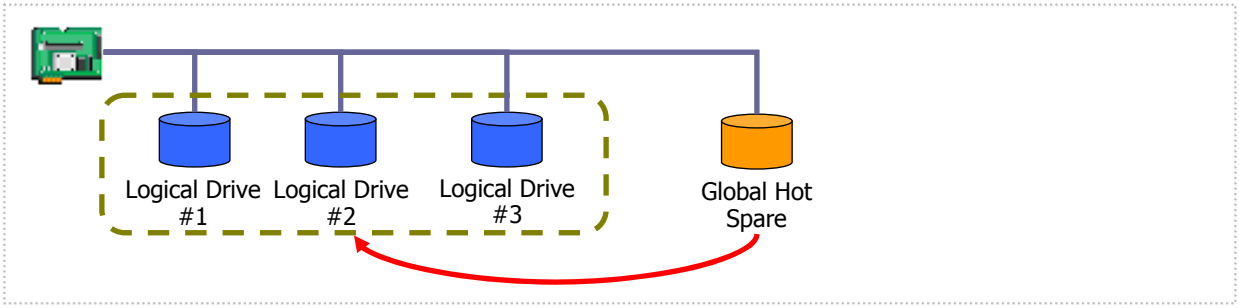


Figure 10 Global Hot Spare 2

About Dedicated Hot Spare

Dedicated Hot Spare is a Hot Spare of specified Logical Drives for a single RAID Controller. The Dedicated Hot Spare features the following:

- Dedicated Hot Spare is a Hot Spare of specified Logical Drives.
- One Dedicated Hot Spare can be a Hot Spare of one or more Logical Drives.
- One or more Dedicated Hot Spare can be a Hot Spare of one or more Logical Drives.

CHECK

- Dedicated Hot Spares cannot be created in a Disk Array containing Logical Drives with the RAID Level being RAID 0.
- Dedicated Hot Spares can not be created in a Disk Array which does not have any Logical Drive.
- Dedicated Hot Spare can be created by a Physical Device as which a Physical Device of the same Interface Type and Device Type to create the Disk Array.

Ex 1 : You make the Dedicated Hot Spare on the RAID Controller which has Logical Drive #1 and #2. If you specify only the Logical Drive #1 as the target Logical Drive, the Dedicated Hot Spare is a Hot Spare of Logical Drive #1.

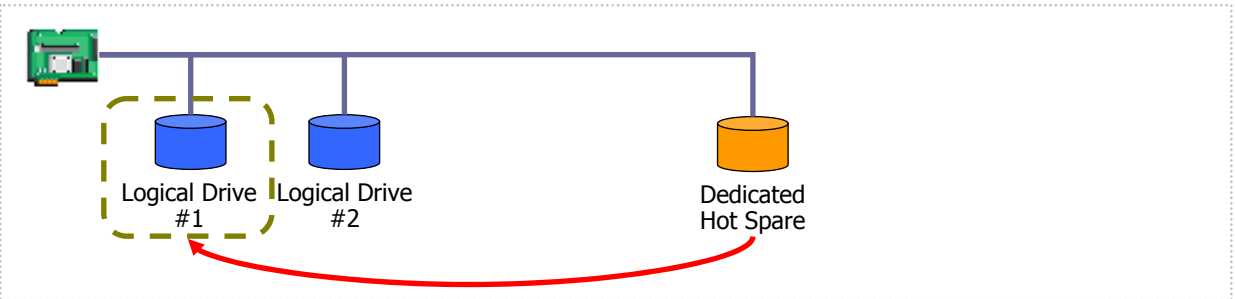


Figure 11 Dedicated Hot Spare 1

Ex 2 : In case of the RAID System in Ex1, If you specify the Logical Drive #1 and #2 as the target Logical Drive, the Dedicated Hot Spare is a Hot Spare of Logical Drive #1 and #2.

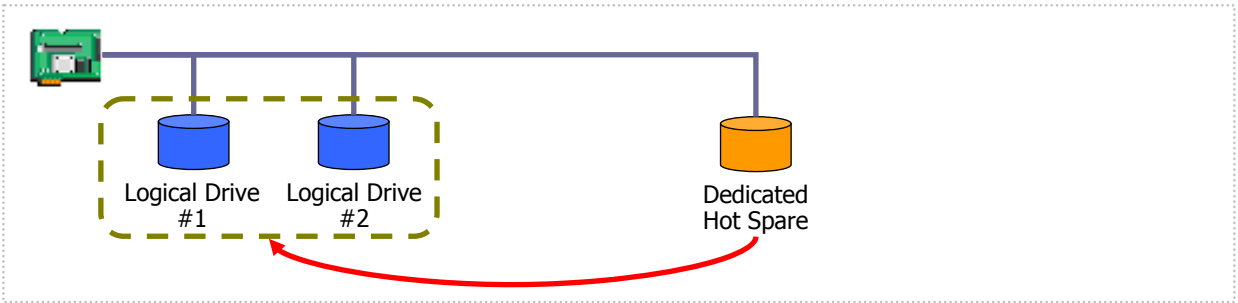


Figure 12 Dedicated Hot Spare 2

Ex 3 : In case of the RAID System in Ex1, you can add more Dedicated Hot Spare . If you add the Dedicated Hot Spare #2 to the Logical Drive #1, the both Dedicated Hot Spare are the Hot Spare for the Logical Drive #1.

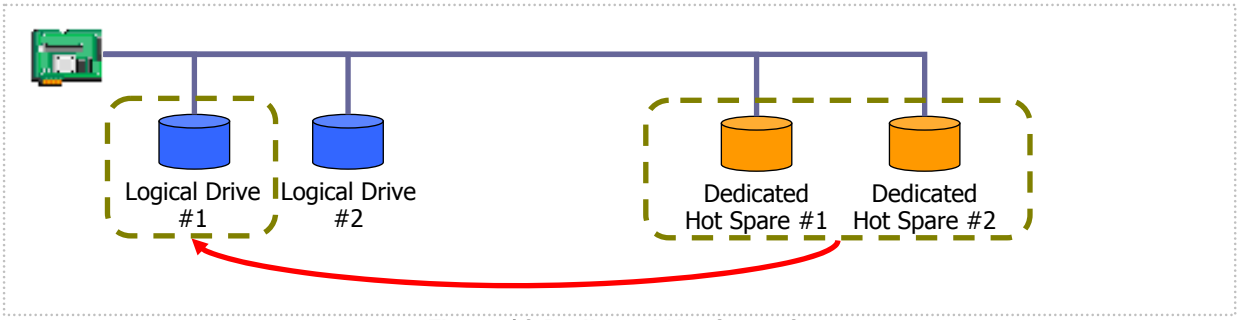


Figure 13 Dedicated Hot Spare 3

Ex 4 : In case of the RAID System in Ex2, you can add more Dedicated Hot Spare likely Ex2. If you add the Dedicated Hot Spare to the Logical Drive #1 and #2, the both Dedicated Hot Spare are the Hot Spare for the Logical Drive #1 and #2.

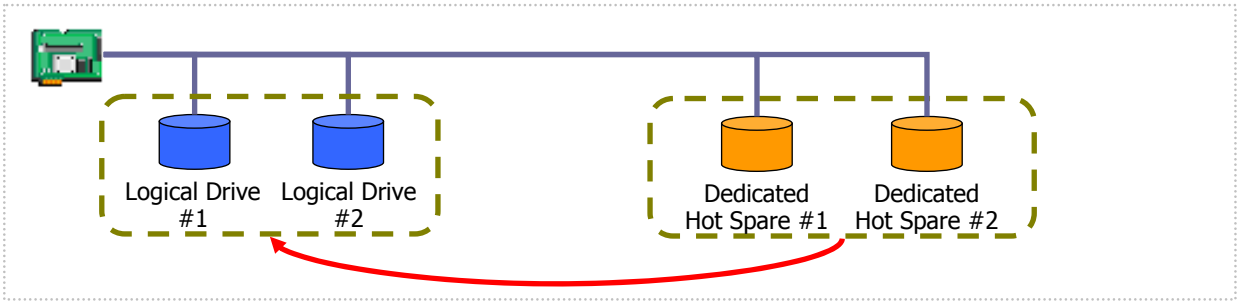


Figure 14 Dedicated Hot Spare 4

Making Global Hot Spare

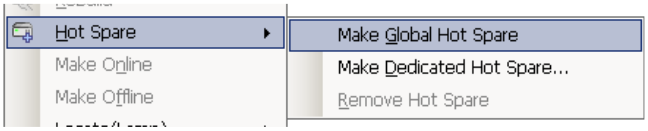
The procedure of making a Global Hot Spare is described below.

RAID Viewer

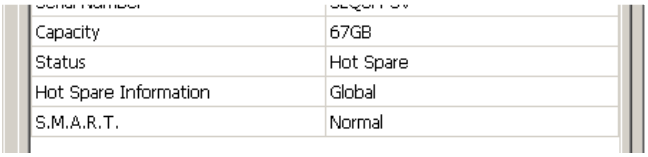
Use [Make Global Hot Spare] in [Control] menu.

Step 1 Start the RAID Viewer. Click a Physical Device with [Status] being [Ready] on the Tree View.

Step 2 Select [Hot Spare] on the pull-down menu of menu item [Control] and click [Make Global Hot Spare].



Step 3 If you see the property of the Physical Device after making a Global Hot Spare, you can find that the value of [Status] is set to [Hot Spare] and item [Hot Spare Information] appears newly with value [Global].



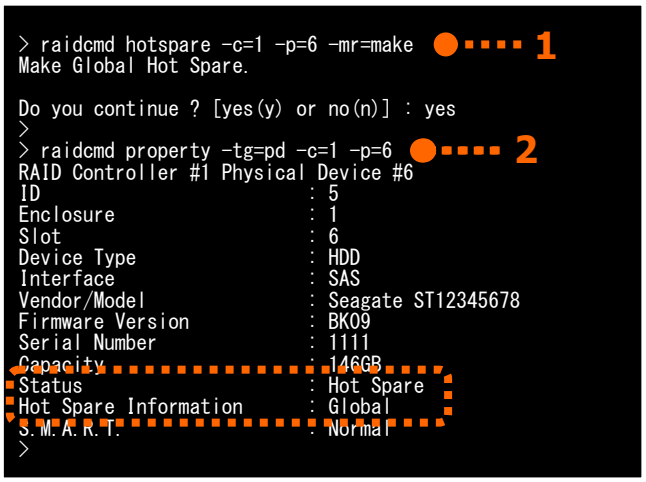
raidcmd

Use "**hotspare**" command.

Step 1 Execute "**hotspare**" command with -mr option and the following parameters.

- Number of the RAID Controller containing the Physical Device with which a Hot Spare is made
- Number of the Physical Device with which a Global Hot Spare is made

Step 2 If you see the property of the Physical Device after making the Global Hot Spare, you find that the value of [Status] is changed to [Hot Spare] and new item [Hot Spare Information] appears with value [Global].



Making Dedicated Hot Spare

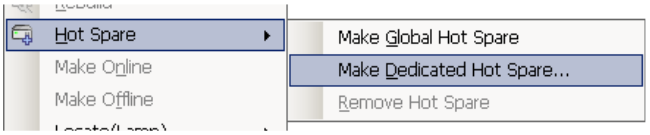
The procedure of making a Dedicated Hot Spare is described below.

RAID Viewer

Use [Make Dedicated Hot Spare] in [Control] menu.

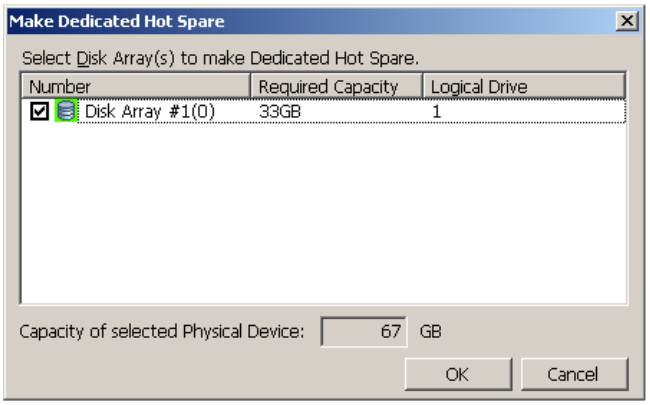
Step 1 Start the RAID Viewer. Click a Physical Device with [Status] being [Ready] on the Tree View.

Step 2 Select [Hot Spare] on the pull-down menu of menu item [Control] and click [Make Dedicated Hot Spare].

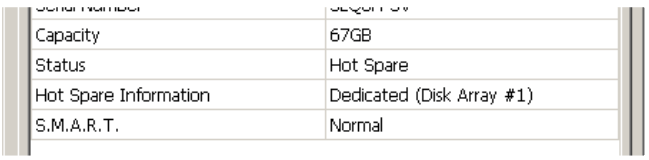


Step 3 The [Make Dedicated Hot Spare] dialog box appears. Check the check box of the Disk Array for which a Dedicated Hot Spare is to be made. The Dedicated Hot Spare may be made for more than one Disk Array. However, it cannot be made for a Disk Array requiring a capacity larger than [Capacity of selected Physical Device].

Click [OK] to make the Dedicated Hot Spare.



Step 4 If you see the property of the Physical Device after making a Dedicated Hot Spare, you can find that the value of [Status] is set to [Hot Spare] and item [Hot Spare Information] appears newly with value [Dedicated (Disk Array #*X*)].



raidcmd

Use "**hotspare**" command.

Step 1 Execute "**hotspare**" command with -mr option and the following parameters.

- Number of the RAID Controller containing the Physical Device with which a Hot Spare is made
- Number of the Physical Device with which a Dedicated Hot Spare is made(The capacity of the Physical Device should be equal to or larger than any Physical Device used by the target Disk Array)
- Number of the target Disk Array using the Dedicated Hot Spare

Step 2 If you see the property of the Physical Device after making the Dedicated Hot Spare, you find that the value of [Status] is changed to [Hot Spare] and new item [Hot Spare Information] appears with value [Dedicated].

```
> raidcmd hotspare -c=1 -p=6 -mr=make -a=2          ●····· 1
Make Dedicated Hot Spare.

Do you continue ? [yes(y) or no(n)] : yes
>
> raidcmd property -tg=pd -c=1 -p=6                 ●····· 2
RAID Controller #1 Physical Device #6
ID                          : 5
Enclosure                   : 1
Slot                        : 6
Device Type                 : HDD
Interface                   : SAS
Vendor/Model                : Seagate ST12345678
Firmware Version            : BK09
Serial Number               : 1111
Capacity                    : 146GB
Status                      : Hot Spare
Hot Spare Information       : Dedicated (Disk Array #2)
S.M.A.R.T.                  : Normal
>
```

Removing Hot Spare

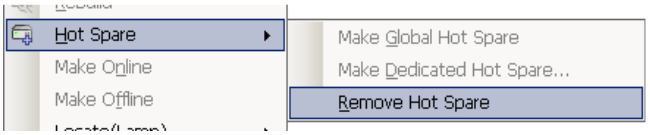
The procedure of removing a Hot Spare is described below.

RAID Viewer

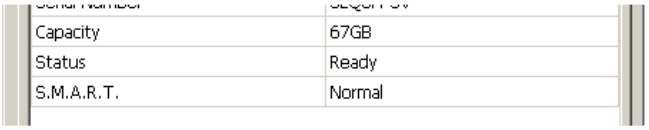
Use [Remove Hot Spare] in [Control] menu.

Step 1 Start the RAID Viewer. Click a Physical Device with [Status] being [Hot Spare] on the Tree View.

Step 2 Select [Hot Spare] on the pull-down menu of menu item [Control] and click [Remove Hot Spare].



Step 3 If you see the property of the Physical Device after removing it from the Hot Spare, you can find that the value of [Status] is set to [Ready] and item [Hot Spare Information] disappears.



raidcmd

Use "**hotspare**" command.

Step 1 Execute "**hotspare**" command with -mr option and the following parameters.

- Number of the RAID Controller containing the Physical Device from which the Hot Spare is removed
- Number of the Physical Device from which the Hot Spare is removed

Step 2 If you see the property of the Physical Device after removing the Hot Spare, the value of [Status] is changed to [Ready] and item [Hot Spare Information] disappears.

```
> raidcmd hotspare -c=1 -p=6 -mr=remove             ●····· 1
Remove Hot Spare.

Do you continue ? [yes(y) or no(n)] : yes
>
> raidcmd property -tg=pd -c=1 -p=6                 ●····· 2
RAID Controller #1 Physical Device #6
ID                          : 5
Enclosure                   : 1
Slot                        : 6
Device Type                 : HDD
Interface                   : SAS
Vendor/Model                : Seagate ST12345678
Firmware Version            : BK09
Serial Number               : 1111
Capacity                    : 146GB
Status                      : Ready
S.M.A.R.T.                  : Normal
>
```

Configuring RAID System Easily

The Universal RAID Utility supports the Easy Configuration function allowing configurations such as creating Logical Drive and making a Hot Spare to be provided in the state where unused Physical Devices are connected to RAID Controllers.

If you decide the number of Physical Devices used for data storage (or the number of Physical Devices configuring Logical Drives) and the number of Physical Devices used as Hot Spares among unused Physical Devices connected to RAID Controllers, the Universal RAID Utility automatically configure the RAID System.
The benefits of configuring a RAID System by using the Easy Configuration are as follows. The Universal RAID Utility performs the jobs which must be examined and manipulated to configure a RAID System instead.

- Allowing a RAID System to be configured only by specifying three items, or a RAID Controller, the number of Physical Devices used for Logical Drives and the number of Logical Drives to be created.
- Allowing the Universal RAID Utility to set all the items associated with Logical Drives (including RAID Level, Capacity, and Stripe Size) automatically.
- Allowing more than one Logical Drive to be created at a time.
- Making Dedicated Hot Spares for Logical Drives automatically created by Universal RAID Utility if Physical Devices are left for Hot Spares.

Procedure of Easy Configuration of RAID System

The following describes the procedure of configuring a RAID System easily.

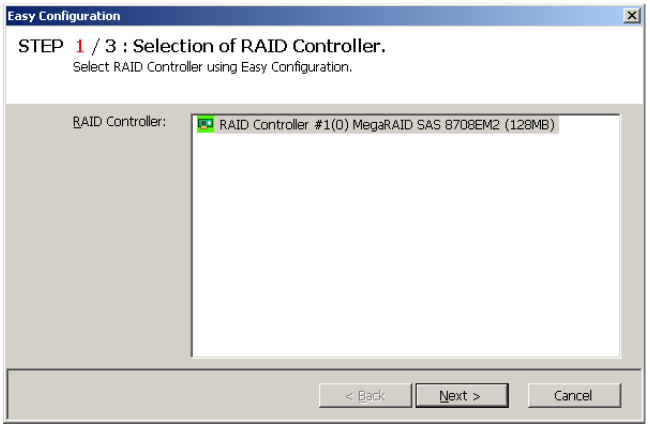
RAID Viewer

Use [Easy Configuration] in [Tool] menu.

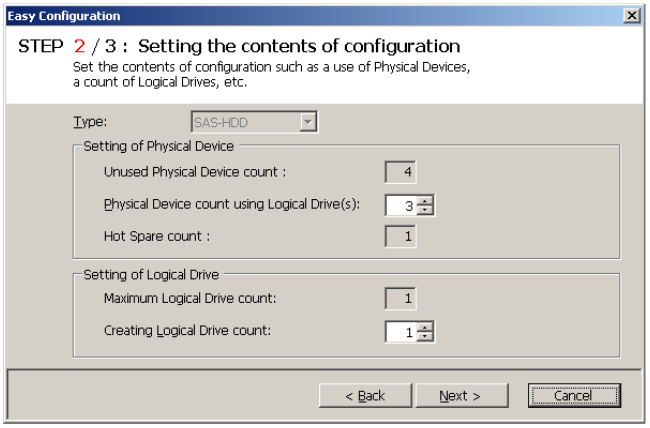
Step 1 Connect Physical Devices used for Easy Configuration to the RAID Controller at this timing if required. If the Physical Devices are connected completely, start the RAID Viewer.

Step 2 Click [Easy Configuration] on the pull-down menu of menu item [Tool].

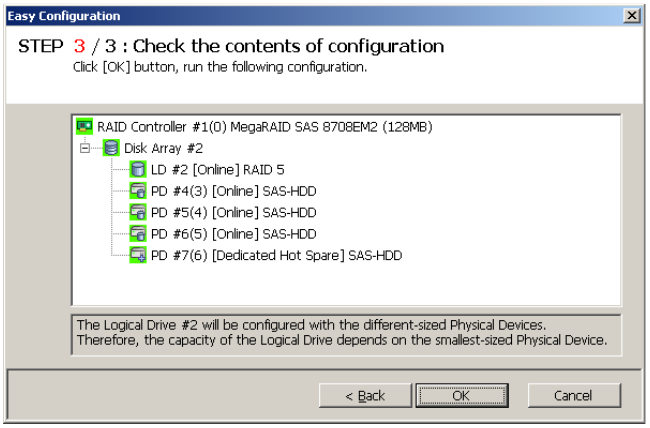
Step 3 The [Easy Configuration] wizard is started. In step 1/3, select the RAID Controller to be configured by clicking it. Then click [Next].
In the [RAID Controller] area, RAID Controllers which do not meet the conditions on Easy Configuration do not appear.


Easy Configuration
STEP 1 / 3 : Selection of RAID Controller.
Select RAID Controller using Easy Configuration.
RAID Controller:
RAID Controller #1(0) MegaRAID SAS 8708EM2 (128MB)
< Back
Next >
Cancel

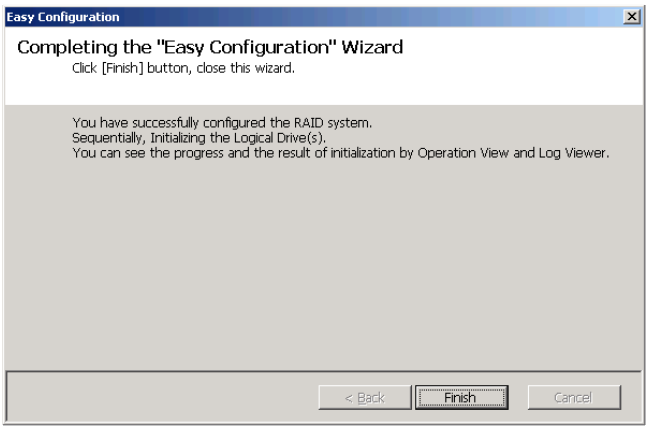
Step 4 In step 2/3, specify the number of Physical Devices used by Logical Drives (or the number of Physical Devices used for data storage) and the number of Logical Drives created in the RAID Controller. If Physical Devices of different interface types or device type exist, specify the number of Physical Devices in each type. After the specification, click [Next].



Step 5 Step 3/3 shows the configuration of the RAID System to be configured by the Easy Configuration. To the RAID System according to the displayed information, click [OK]. To change the configuration, click [Back].


Easy Configuration
STEP 3 / 3 : Check the contents of configuration
Click [OK] button, run the following configuration.
RAID Controller #1(0) MegaRAID SAS 8708EM2 (128MB)
Disk Array #2
LD #2 [Online] RAID 5
PD #4(3) [Online] SAS-HDD
PD #5(4) [Online] SAS-HDD
PD #6(5) [Online] SAS-HDD
PD #7(6) [Dedicated Hot Spare] SAS-HDD
The Logical Drive #2 will be configured with the different-sized Physical Devices.
Therefore, the capacity of the Logical Drive depends on the smallest-sized Physical Device.
< Back
OK
Cancel

Step 6 If you click [OK] in step 3/3, then the RAID System will be configured. After the Logical Drives are created and the makings of Hot Spares are completed, [Completing the "Easy Configuration" Wizard] appears. Now creating the Logical Drives and making Hot Spares is completed. After the wizard is closed, see the Tree View to check the configuration. However, the Initialize of the Logical Drives having been created may not be completed. The progress and result of initializing the Logical Drives can be checked on the Operation View.


Easy Configuration
Completing the "Easy Configuration" Wizard
Click [Finish] button, close this wizard.
You have successfully configured the RAID system.
Sequentially, Initializing the Logical Drive(s).
You can see the progress and the result of initialization by Operation View and Log Viewer.
< Back
Finish
Cancel

raidcmd

Use "**econfig**" command.

Step 1 Connect Physical Devices used for Easy Configuration to the RAID Controller at this timing if required.

Step 2 Execute "**econfig**" command.

Step 3 Specify the conditions on Easy Configuration.
In step 1/3, select the RAID Controller to be configured. Enter the RAID Controller number to be configured.

Step 4 In step 2/3, specify the number of Physical Devices used for Logical Drive(s) ("Physical Device count using Logical Drive(s)") and the number of Logical Drives to be created in the RAID Controller ("Making Logical Drive count"). If Physical Devices of different Interface Types or Device Type exist, specify the number of Physical Devices in each type (in the example shown to the right, proper settings are provided for Physical Devices of the SAS interface. If other Physical Devices of different types exist, perform the operation in each type).

Step 5 Step 3/3 shows the configuration of the RAID System to be configured by the Easy Configuration. To configure the RAID System according to the displayed information, type "yes". To change the configuration, type "no".
If you type "yes", the raidcmd executes the configuration of the RAID System and terminates normally. Making Logical Drives and Hot Spares is now completed. See the property of each component to check the configuration. However, the Initialize of the Logical Drives having been created may not be completed. The progress and result of initializing the Logical Drives can be checked by using "**oplist**" command.

```
> raidcmd econfig ●···· 2
Step 1/3 : Select RAID Controller

RAID Controller #1 MegaRAID SAS PCI Express(TM) ROMB
RAID Controller #2 LSI Corporation MegaRAID SAS 8408E

RAID Controller [1-2] : 1 ●···· 3

Step 2/3 : Set the contents of configuration

<Physical Device (Type : SAS)>
Unused Physical Device count                          : 7
Physical Device count using Logical Drive(s) [ 2- 7] : 6
Hot Spare count                                       : 1

Do you continue ? [yes(y) or no(n)] : y ●···· 4

Maximum Logical Drive count                           : 2
Creating Logical Drive count [ 1- 2]                  : 1

Do you continue ? [yes(y) or no(n)] : y

Step 3/3 : Confirm the contents of configuration

RAID Controller #1(0) LSI MegaRAID SAS 8202E
  Disk Array #1
    LD #1 [Online] RAID 5
    PD #1(0) [Online] SAS-HDD
    PD #2(1) [Online] SAS-HDD
    PD #3(2) [Online] SAS-HDD
    PD #7(6) [Dedicated Hot Spare] SAS-HDD
  Disk Array #2
    LD #2 [Online] RAID 5
    PD #4(3) [Online] SAS-HDD
    PD #5(4) [Online] SAS-HDD
    PD #6(5) [Online] SAS-HDD
    PD #7(6) [Dedicated Hot Spare] SAS-HDD
  Disk Array #3
    LD #3 [Online] RAID 1
    PD #8(7) [Online] SATA-HDD
    PD #9(8) [Online] SATA-HDD
    PD #10(9) [Dedicated Hot Spare] SATA-HDD

<Caution>
Create Logical Drive #2 with different Physical Devices of
a capacity. Therefore, Logical Drive capacity is decided by
the smallest Physical Device of capacity.

Run the above configuration.
Initialize all of Logical Drive after creating them. You can
see the progress and the result of initialization by "oplist"
and "property" commands.

Do you continue ? [yes(y) or no(n)] : yes ●···· 5
>
```

TIPS

RAID Controller and Physical Device has two numbers in Step 3/3.
RAID Controller #A (B)
Physical Device #C (D)
A : The number of RAID Controller, B : ID of RAID Controller
C : The number of Physical Device, D : ID of Physical Device

RAID Controller Enabling Easy Configuration to Be Executed

Any RAID Controller enabling Easy Configuration to be executed must meet the following conditions.

Allowing Dedicated Hot Spares to be made, and

Connecting with more than one unused Physical Device.

Physical Devices Available for Easy Configuration

Only unused Physical Devices are available for Easy Configuration. Unused Physical Devices are those with their [Status] being [Ready].

Creating Logical Drives by Easy Configuration

Logical Drives created by Easy Configuration are described below.

RAID Levels and the number of Logical Drives allowed to be created

The RAID Level of a Logical Drive created by Easy Configuration should be RAID 1 or RAID 5. Whether RAID 1 or RAID 5 is used is defined by RAID Levels supported by the RAID Controller and the number of Physical Devices used by the Logical Drive.
The number of Logical Drives allowed to be created is also defined by the similar conditions.

RAID Controller supporting RAID Levels RAID 1 and RAID 5

Number of Physical Devices used by Logical Drive	RAID Level of Logical Drive	Number of Logical Drives allowed to be created
2	RAID 1	1
3 - 5	RAID 5	1
6 or more	RAID 5	Number of Physical Devices used by Logical Drive / 3

RAID Controller supporting RAID 1 only

Number of Physical Devices used by Logical Drive	RAID Level of Logical Drive	Number of Logical Drives allowed to be created
2 or more	RAID 1	Number of Physical Devices used by Logical Drive / 2

IMPORTANT

The Easy Configuration can only create Logical Drives of RAID 1 or RAID 5.

Physical Devices used for Logical Drives

Physical Devices of lower Physical Device Numbers are used preferentially for Logical Drives to be created excluding those for making Hot Spares.

Ex. : If Physical Devices #1 - #7 can be used for Easy Configuration and Physical Device #3 is used as a Hot Spare, Logical Drives #1 and #2 are created with Physical Devices #1 and #2 having lower Physical Device Numbers and Physical Devices #5, #6 and #7, respectively.

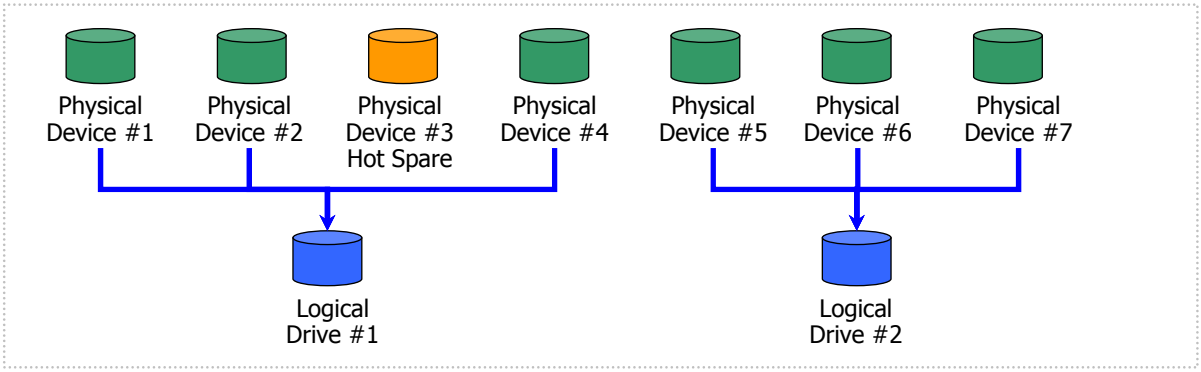


Figure 15 Assigning Physical Devices in Easy Configuration 1

If more than one Logical Drive are created and the number of Physical Devices configuring a Logical Drive is not equal to others, a larger number of Physical Devices should be assigned to a Logical Drive having a smaller logical number.

Ex.: If Physical Devices #1 - #7 can be used for Easy Configuration and two Logical Drives are created, Logical Drives #1 and #2 are created with four Physical Devices #1 - #4 and three Physical Devices #5 - #7, respectively.

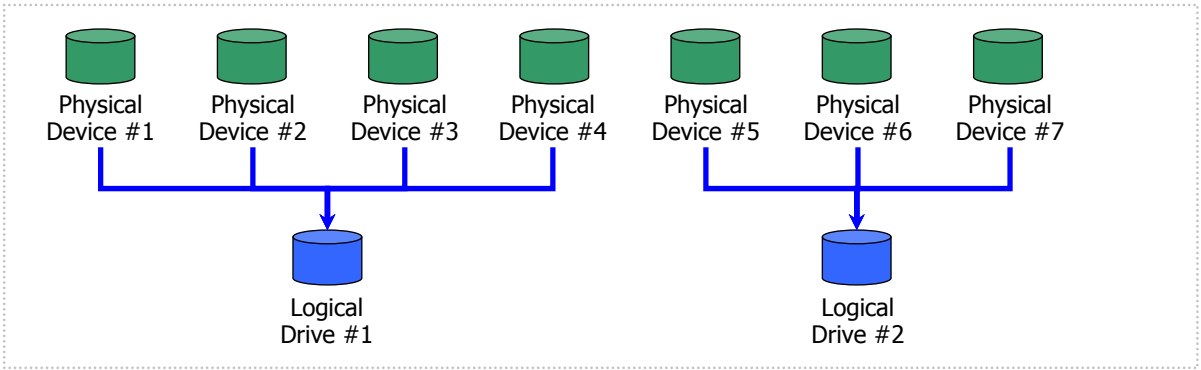


Figure 16 Assigning Physical Devices in Easy Configuration 2

CHECK

Physical Devices in which S.M.A.R.T. errors are detected cannot be used to create Logical Drives.

Capacity of Logical Drive

The capacity of a Logical Drive to be created is defined by the RAID Level and the capacities of Physical Devices used for the Logical Drive.
The Easy Configuration uses the entire areas of the Physical Devices to create a Logical Drive.

When a single Logical Drive is created by using Physical Devices of different capacities, the smallest capacity is applied among those of the Physical Devices.

Ex.: If Physical Devices #1 - #7 of different capacities can be used in Easy Configuration to create two Logical Drives, use Physical Devices #1 - #4 and #5 - #7 to create Logical Drives #1 and #2, respectively. The capacity of each Logical Drive is defined by the smallest capacity among those of the Physical Devices for the Logical Device.

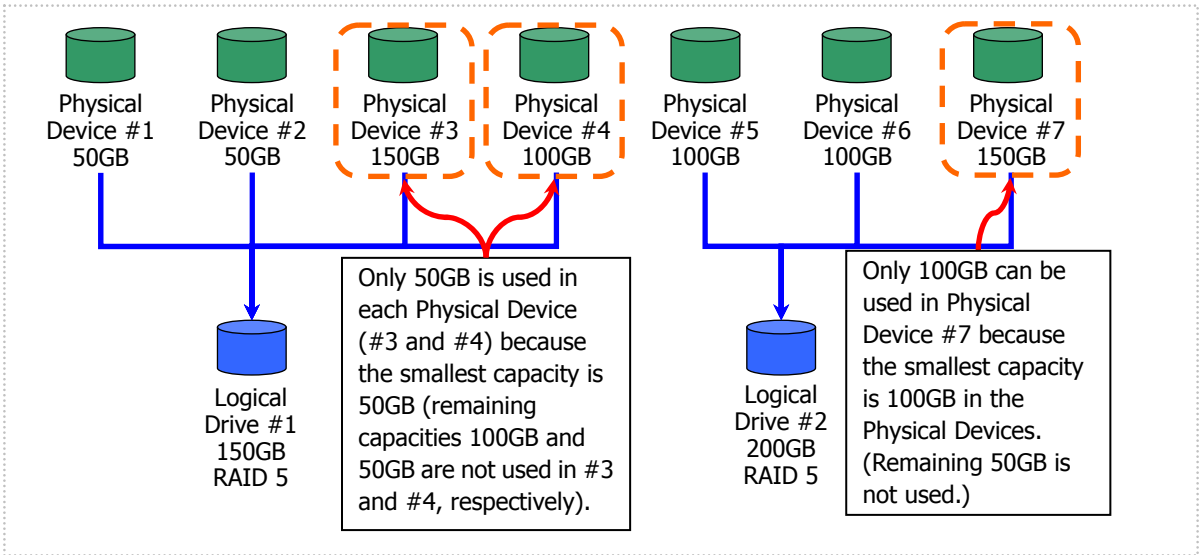

Physical Device #1 50GB
Physical Device #2 50GB
Physical Device #3 150GB
Physical Device #4 100GB
Physical Device #5 100GB
Physical Device #6 100GB
Physical Device #7 150GB
Logical Drive #1 150GB RAID 5
Logical Drive #2 200GB RAID 5
Only 50GB is used in each Physical Device (#3 and #4) because the smallest capacity is 50GB (remaining capacities 100GB and 50GB are not used in #3 and #4, respectively).
Only 100GB can be used in Physical Device #7 because the smallest capacity is 100GB in the Physical Devices. (Remaining 50GB is not used.)

Figure 17 Capacities of Logical Drives in Easy Configuration

Items set for Logical Drive

The values of other selection items set for a Logical Drive to be created are defined as shown in the table below.

Selection item	Value
Stripe Size	Uses the default value set for the RAID Controller. (The value varies depending on the type of the RAID Controller.)
Cache Mode	Uses the default value set for the RAID Controller. (The value varies depending on the type of the RAID Controller.)
Initialization Mode	Full

Making Hot Spares by Easy Configuration

This section describes the information on Hot Spares to be made by the Easy Configuration.

Number of Hot Spares

The number of Hot Spares is defined by the number of unused Physical Devices connected to the RAID Controller and the number of Physical Devices used for Logical Drives. The number of Hot Spares results from subtracting [Number of Physical Devices specified for Logical Drives] from [Unused Physical Device count] in step 2/3 of the [Easy Configuration] wizard of RAID Viewer or "**econfig**" command of raidcmd.

Physical Devices used as Hot Spares

Physical Devices of larger capacities are preferentially used as Hot Spares. Among Physical Devices of the same capacity, Physical Devices of larger Physical Device Numbers are preferentially used as Hot Spares.

Ex.: For the example shown below, Physical Devices #1 - #7 can be used in Easy Configuration to make two Hot Spares. Three Physical Devices have the largest capacity of 150GB. Accordingly, use Physical Devices #5 and #6 of larger Physical Device Numbers among the three Physical Devices as Hot Spares.

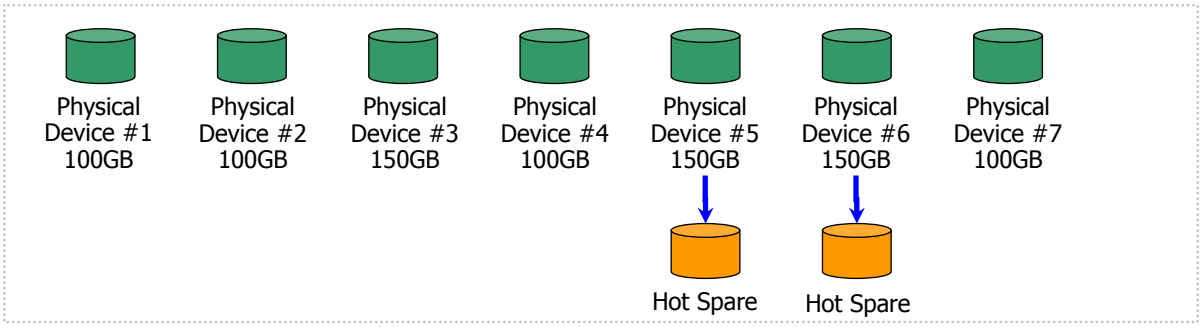


Figure 18 Assigning Hot Spares in Easy Configuration

CHECK Physical Devices in which S.M.A.R.T. errors are detected cannot be used to make Hot Spares.

Modes of Hot Spares

The Easy Configuration can only make Dedicated Hot Spares but cannot make Global Hot Spares.
If more than one Logical Drive is created, the Dedicated Hot Spare can be used for all Logical Drives to be created.

Ex.: If Physical Devices #1 - #7 are used in Easy Configuration to create two Logical Drives and a single Hot Spare, the Hot Spare will be the Dedicated Hot Spare for each Logical Drive.

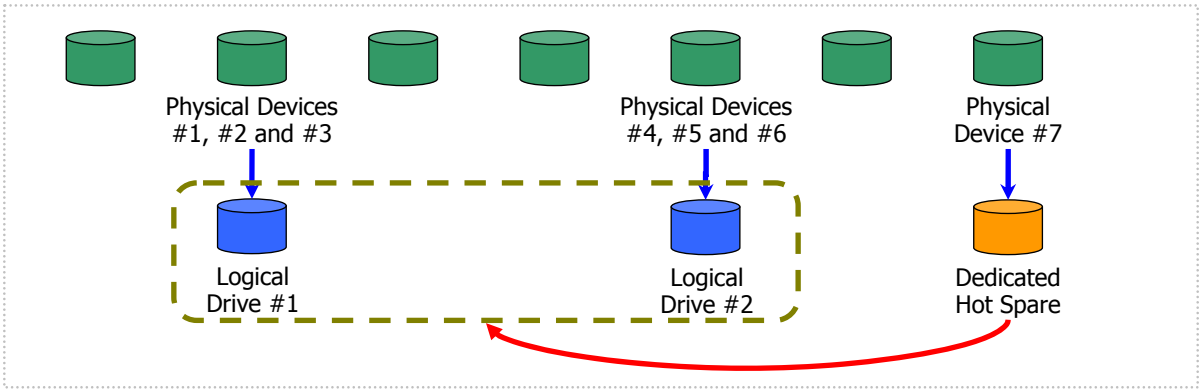


Figure 19 Making Dedicated Hot Spare in Easy Configuration 1

Ex.: If Physical Devices #1 - #8 are used in Easy Configuration to create two Logical Drives and two Hot Spares, Hot Spares #1 and #2 will be the Dedicated Hot Spares for Logical Drives #1 and #2, respectively.

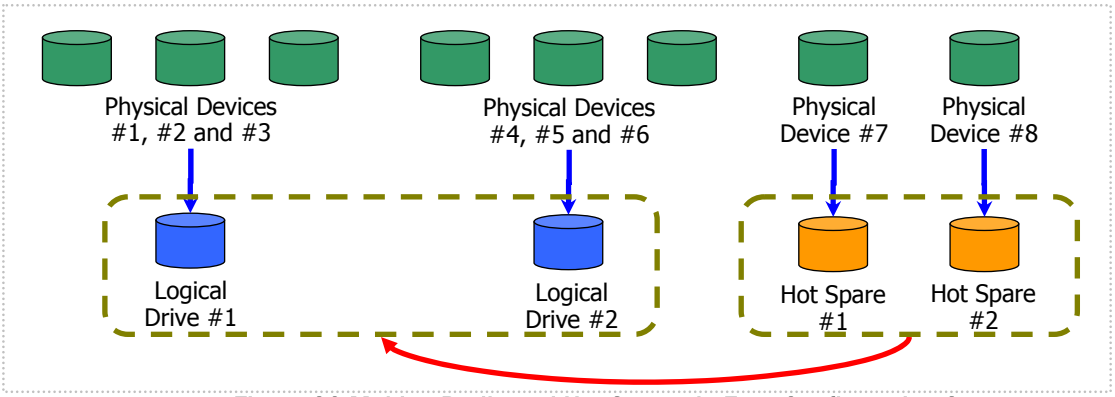


Figure 20 Making Dedicated Hot Spares in Easy Configuration 2

Creating Logical Drive Easily

The Universal RAID Utility supports "Create Logical Drive - Simple Mode" in which a Logical Drive can be created only by selecting two selection items according to the guide.

"Create Logical Drive - Simple Mode" allows you to create a Logical Drive only by specifying two selection items, or the RAID Level of the Logical Drive and Physical Devices to be used.
The benefits of creating a Logical Drive with "Create Logical Drive - Simple Mode" are as follows. The Universal RAID Utility defines selection items which you should examine to create a Logical Drive instead of you.

- Allowing a Logical Drive to be created only by specifying two selection items (RAID Level and Physical Devices to be used).
- Allowing the Universal RAID Utility to set all setting items (including Capacity and Stripe Size) other than the RAID Level and Physical Devices to be used automatically.

Operation Procedure of "Create Logical Drive - Simple Mode"

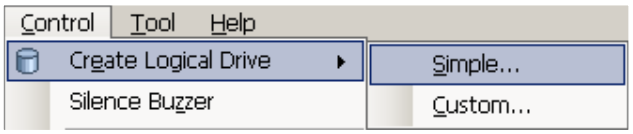
This section describes the procedure of creating a Logical Drive by "Create Logical Drive - Simple Mode".

RAID Viewer

Use [Create Logical Drive (Simple)] in [Control] menu.

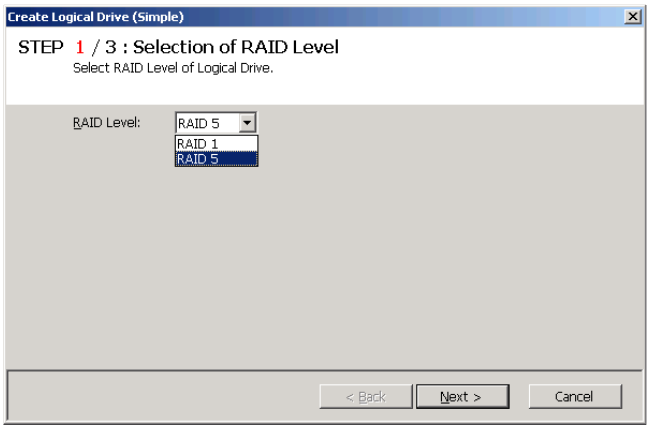
Step 1 Connect Physical Devices used for a Logical Drive to the RAID Controller at this timing if required. If the Physical Devices are connected completely, start the RAID Viewer.

Step 2 Click the RAID Controller on the Tree View, select [Create Logical Drive] on the pull-down menu of menu item [Control], and click [Simple...].

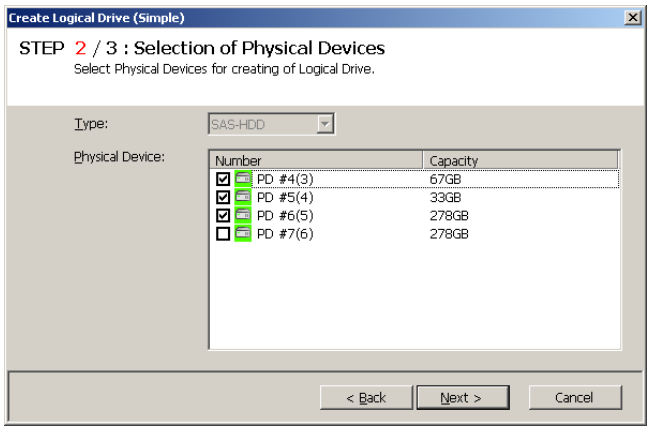


CHECK If only a single unused Physical Device exists in the RAID Controller, "Create Logical Drive - Simple Mode" is disabled.

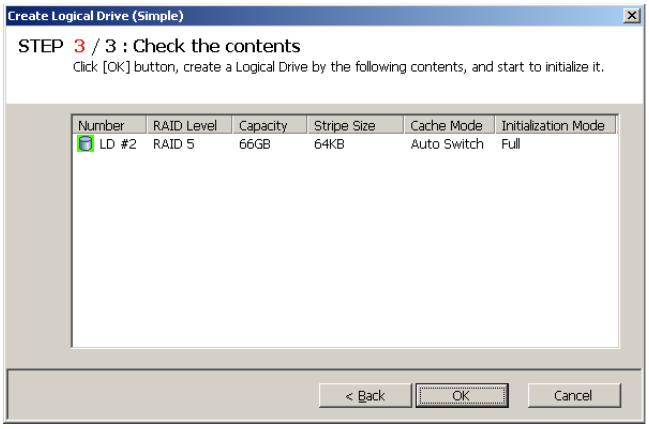
Step 3 The [Create Logical Drive (Simple)] wizard is started.
In step 1/3, select the RAID Level of the Logical Drive to be created. After the selection, click [Next].



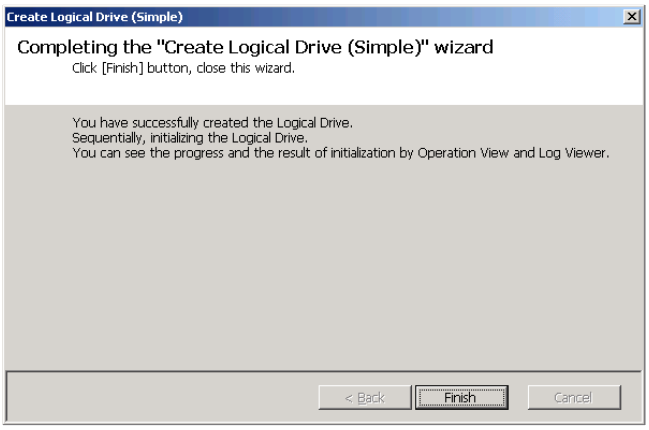
Step 4 In step 2/3, select Physical Devices to be used to create the Logical Drive. If Physical Devices of different types exist in the RAID Controller, click the type to be used on [Type]. Next, check the check boxes of Physical Devices to be used on [Physical Device]. You must select Physical Devices to be used by the number allowing the RAID Level selected in Step 1/3 to be created. After selecting Physical Devices properly, click [Next].



Step 5 Step 3/3 indicates the information on the Logical Drive to be created. Click [OK] to create the Logical Drive with the functions. Click [Back] to change one or more functions.



Step 6 In step 3/3, click [OK] to create the Logical Drive. After the Logical Drive is created completely, [Completing the "Create Logical Drive (Simple)" Wizard] appears. Now the Logical Drive has been created completely. Close the wizard and check the information on the Logical Drive on the Tree View. However, the Logical Drive having been created may not be initialized yet. Check the progress or result of the Initialize of the Logical Drive on the Operation View.


Create Logical Drive (Simple)
Completing the "Create Logical Drive (Simple)" wizard
Click [Finish] button, close this wizard.
You have successfully created the Logical Drive.
Sequentially, initializing the Logical Drive.
You can see the progress and the result of initialization by Operation View and Log Viewer.
< Back
Finish
Cancel

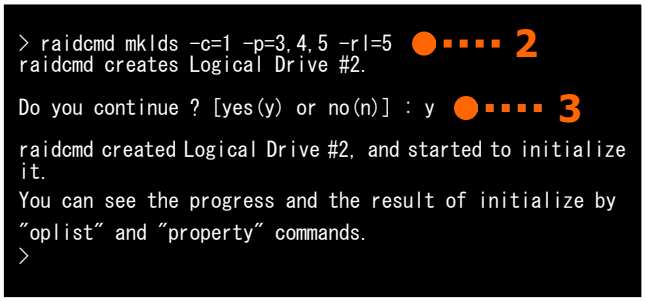
raidcmd

Use "**mklds**" command.

Step 1 Connect Physical Devices used for a Logical Drive to the RAID Controller at this timing if required.

Step 2 Execute "**mklds**" command with the following parameters.

- Number of the RAID Controller in which a Logical Drive is created
- Numbers of the Physical Devices with which a Logical Drive is created (The required number of Physical Devices varies depending on the RAID Level of the Logical Drive to be created).
- RAID Level at which a Logical Drive is made ("Create Logical Drive - Simple Mode" allows a Logical Drive with RAID Level being RAID 1 or RAID 5 to be created)


> raidcmd mklds -c=1 -p=3,4,5 -rl=5
2
raidcmd creates Logical Drive #2.
Do you continue ? [yes(y) or no(n)] : y
3
raidcmd created Logical Drive #2, and started to initialize it.
You can see the progress and the result of initialize by "oplist" and "property" commands.
>

Step 3 Type "yes" to reply to the confirmation message. Then a Logical Drive is created.

Step 4 After the Logical Drive is created completely, the raidcmd terminates normally. The Logical Drive has been created completely. You can check the information on the Logical Drive by using "**property**" command. However, the Initialize of the Logical Drive having been created may not be completed. The progress and result of initializing the Logical Drive can be checked by using "**oplist**" command.

Physical Devices Available for "Create Logical Drive - Simple Mode"

Unused Physical Devices are available for "Create Logical Drive - Simple Mode". Unused Physical Devices are those with their [Status] being [Ready].

Physical Devices in which S.M.A.R.T. errors are detected cannot be used to create Logical Drives.

Creating Logical Drives by "Create Logical Drive - Simple Mode"

This section describes the information on Logical Drives to be created by "Create Logical Drive - Simple Mode".

RAID Level

The RAID Level of a Logical Drive which can be created by "Create Logical Drive - Simple Mode" should be RAID 1 or RAID 5.

Capacity of Logical Drive

The capacity of a Logical Drive to be created is defined by the RAID Level and the capacities of Physical Devices used for the Logical Drive. In "Create Logical Drive - Simple Mode", a Logical Drive is created by using the entire areas of the Physical Devices.

Items set for Logical Drive

The values of other selection items set for a Logical Drive to be created are defined as shown in the table below.

Selection item	Value
Stripe Size	Uses the default value set for the RAID Controller. (The value varies depending on the type of the RAID Controller.)
Cache Mode	Uses the default value set for the RAID Controller. (The value varies depending on the type of the RAID Controller.)
Initialization Mode	Full

Creating Logical Drive Freely

The Universal RAID Utility supports "Create Logical Drive - Custom Mode" in which a Logical Drive can be created as required by specifying the setting items of the Logical Drive closely.

"Create Logical Drive - Custom Mode" allows you to create a Logical Drive by specifying the setting items of the Logical Drive closely. It can also be used to create Logical Drives of several RAID Levels or create a Logical Drive by using unused area of Disk Array. In addition, "Create Logical Drive - Custom Mode" enables more than one Logical Drive to be created at a time.
The benefits of creating Logical Drives by "Create Logical Drive - Custom Mode" are as follows:

- Allows Logical Drives of various RAID Levels (RAID 0, RAID 1, RAID 5, RAID 6, RAID 10, and RAID 50) to be created.
- Allows selection items (including Capacity, Stripe Size, Cache Mode and Initialization Mode) to be specified closely.
- Allows not only unused Physical Devices but also unused area of Disk Array to be used to create a Logical Drive of RAID 0, RAID 1, RAID 5, or RAID 6.
- Allows more than one Logical Drive to be created by a set of operations (only RAID Viewer).

Operation Procedure of "Create Logical Drive - Custom Mode"

This section describes the procedure of creating a Logical Drive by "Create Logical Drive - Custom Mode".

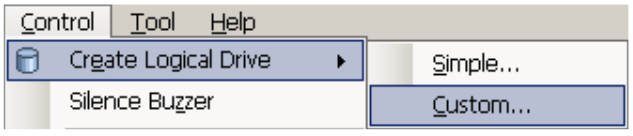
"Create Logical Drive - Custom Mode" is available only in the Advanced Mode.

RAID Viewer

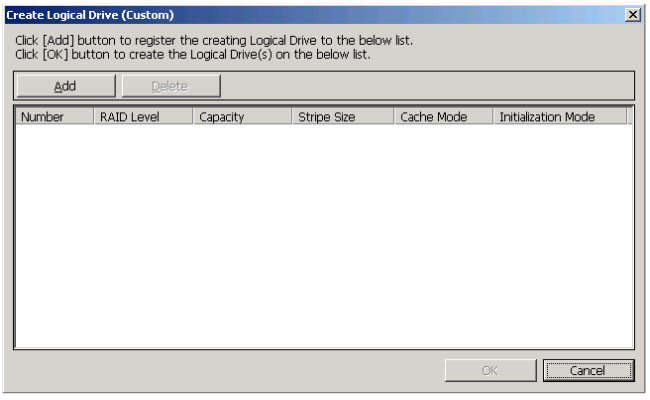
Use [Create Logical Drive(Custom)] in [Control] menu.

Step 1 Connect Physical Devices used for a Logical Drive to the RAID Controller at this timing if required. If the Physical Devices are connected completely, start the RAID Viewer.

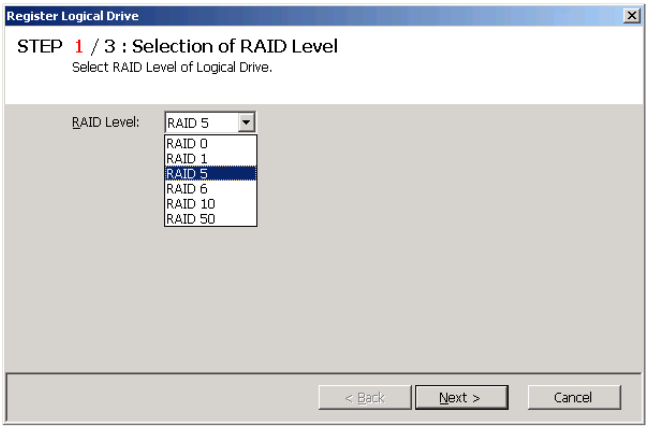
Step 2 Change the running mode to the Advanced Mode if it is set to the Standard Mode. To do this, click [Advanced Mode] on the pull-down menu of menu item [Tool].
Click a RAID Controller on the Tree View, select [Create Logical Drive] on the pull-down menu of menu item [Control], and click [Custom...].



Step 3 The [Create Logical Drive (Custom)] dialog box is started. In the Custom Mode, register a Logical Drive to be created to the list of the dialog box. If the Logical Drive may be registered, click [Add]. To delete a registered Logical Drive, click the Logical Drive to be deleted and click [Delete].



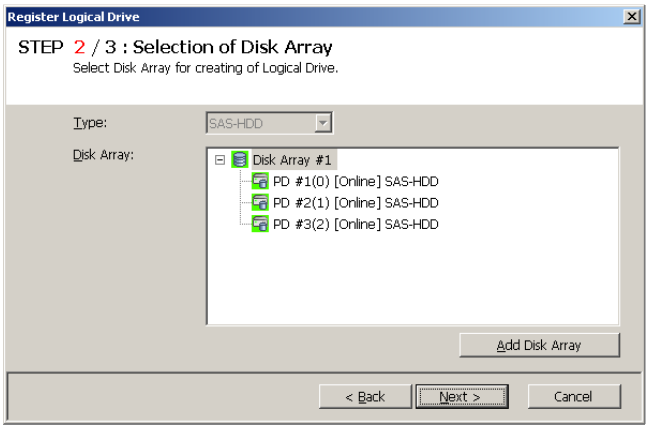
Step 4 If you click [Add] in the [Create Logical Drive (Custom)] dialog box, the [Register Logical Drive] wizard is started. In step 1/3, select the RAID Level of the Logical Drive to be registered. After the selection, click [Next].



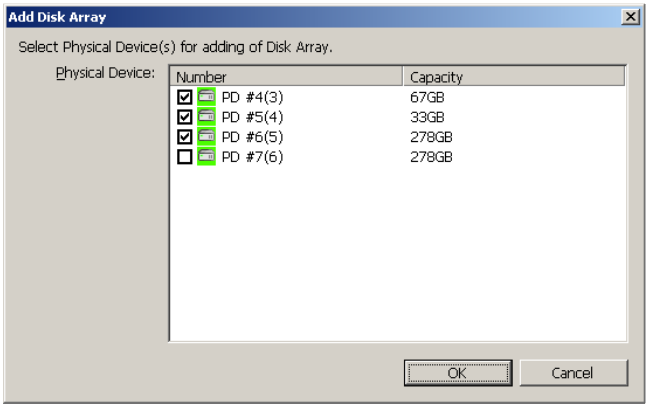
Step 5 In step 2/3, the operation varies depending on the RAID Level selected in step 1/3.

(1) When RAID 0, RAID 1, RAID 5, or RAID 6 is selected as the RAID Level, select a Disk Array to be used for the Logical Drive.

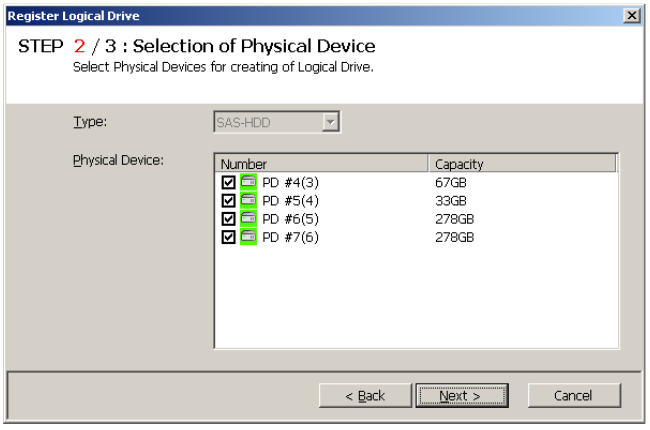
If the RAID Controller contains Physical Devices of different types, click the type to be used on [Type]. Next, click the Disk Array node to be used on [Disk Array]. After the selection, click [Next].



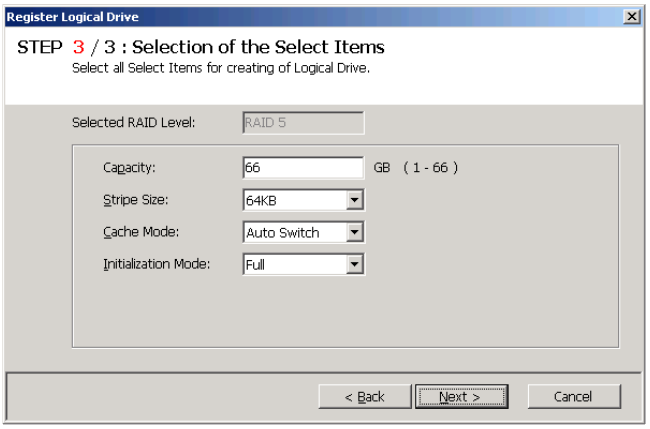
To create a Disk Array to be used newly, click [Add Disk Array]. Then the [Add Disk Array] dialog box appears. Check the check boxes of Physical Devices to be used for the added Disk Array by the number required for the RAID Level to be created. Then click [OK]. The newly created Disk Array is added to [Disk Array] in step 2/3 of the [Register Logical Drive] wizard.



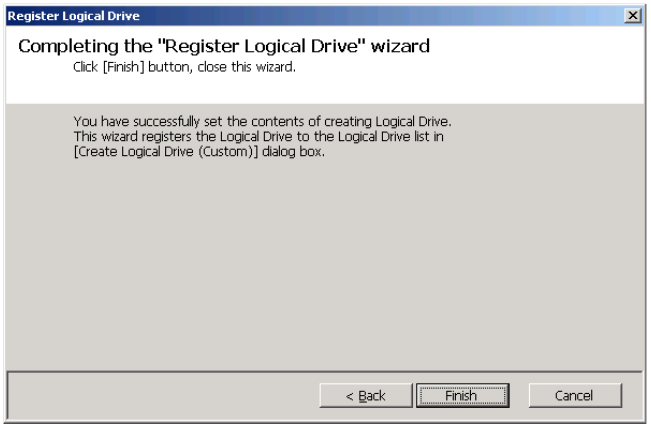
(2) RAID 10 or RAID 50 is select as the RAID Level, select Physical Devices used for the Logical Drive. For RAID 10, check the check boxes of four Physical Devices. For RAID 50, check the check boxes of six or larger Physical Devices. Further, the number of Physical Devices should be even. After the selection, click [Next].



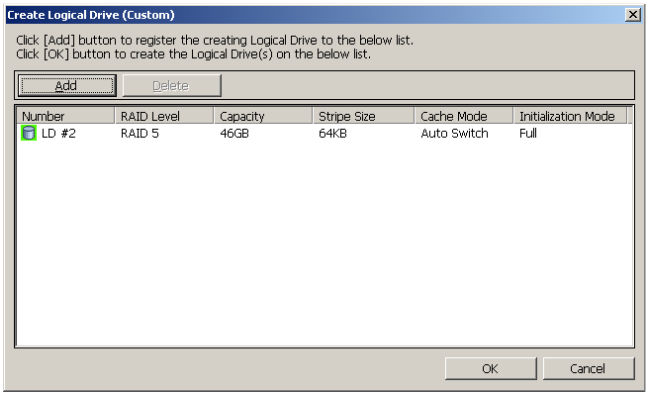
Step 6 In step 3/3, select the setting items of the Logical Drive to be registered. [Capacity] should be a value within the Capacity of the Logical Drive to be created. If the RAID Level of the Logical Drive to be created is RAID 10 or RAID 50, you may not enter the value. Select [Stripe Size], [Cache Mode] and [Initialization Mode]. After selecting all the setting items, click [Next].



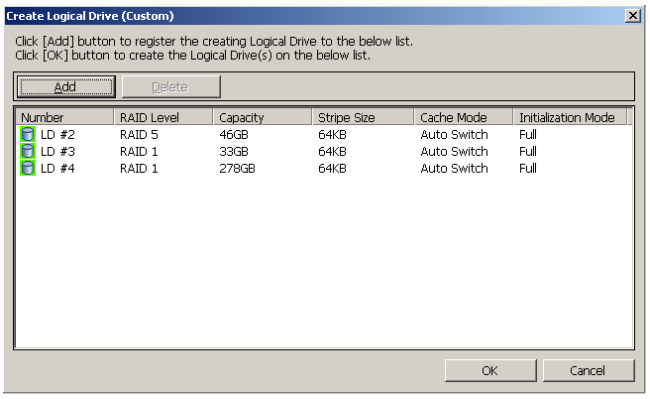
Step 7 If you click [Next] in step 3/3, then [Completing the "Register Logical Drive" Wizard] will appear. Click [Finish] to register the Logical Drive with the data selected on the wizard. To change some data, click [Back].


Register Logical Drive
Completing the "Register Logical Drive" wizard
Click [Finish] button, close this wizard.
You have successfully set the contents of creating Logical Drive.
This wizard registers the Logical Drive to the Logical Drive list in
[Create Logical Drive (Custom)] dialog box.
< Back
Finish
Cancel

Step 8 At the completion of the [Register Logical Drive] wizard, the Logical Drive is registered in the list of the [Create Logical Drive (Custom)] dialog box.



Step 9 To create other Logical Drives, click [Add] and repeat steps 4 to 8 by the number of Logical Drives to be created.
After registering all Logical Drives to create, click [OK]. Then the dialog box is closed and the registered Logical Drives are created. Check the contents of the Logical Drives on the Tree View and/or their properties. However, the Initialize of the Logical Drives having been created may not be completed. The progress and result of initializing the Logical Drives can be checked on the Operation View.

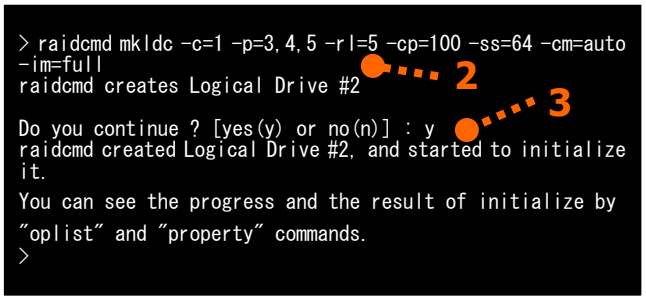


raidcmd

Use "**mkldc**" command. A count of Logical Drive created by raidcmd is 1 at same time.

Step 1 Connect Physical Devices used for a Logical Drive to the RAID Controller at this timing if required.

Step 2 Execute "**mkldc**" command with the following parameters.


> raidcmd mkldc -c=1 -p=3,4,5 -rl=5 -cp=100 -ss=64 -cm=auto -im=full
raidcmd creates Logical Drive #2
2
Do you continue ? [yes(y) or no(n)] : y
3
raidcmd created Logical Drive #2, and started to initialize it.
You can see the progress and the result of initialize by "oplist" and "property" commands.
>

- Number of the RAID Controller in which a Logical Drive is created
- Numbers of the Physical Devices used to create a Logical Drive if used(The required number of Physical Devices varies depending on the RAID Level of the Logical Drive to be created)
- Number of the Disk Array used to create a Logical Drive if used
- RAID Level of a Logical Drive to be created("Create Logical Drive - Custom Mode" allows a Logical Drive with RAID Level being RAID 0 RAID 1, RAID 5, RAID 6, RAID 10, RAID 50 to be created)
- Capacity of a Logical Drive to be created(This value may be omitted if a Logical Drive is created by using unused Physical Devices entirely)
- Stripe Size of a Logical Drive to be created(This value may not be specified if the default value for the RAID Controller is used)
- Cache Mode of a Logical Drive to be created(This value may not be specified if the default value for the RAID Controller is used)
- Operation mode for Initialize executed after a Logical Drive is created(The [Full] mode is recommended. In the [Full] mode, the Initialize Mode may not be specified)

Step 3 Type "yes" to reply to the confirmation message. Then a Logical Drive is created.

Step 4 After the Logical Drive is created completely, the raidcmd terminates normally. The Logical Drive has been created completely. You can check the information on the Logical Drive by using "**property**" command. However, the Initialize of the Logical Drive having been created may not be completed. The progress and result of initializing the Logical Drive can be checked by using "**oplist**" command.

Disk Arrays and Physical Devices Available for "Create Logical Drive - Custom Mode"

For "Create Logical Drive - Custom Mode", Disk Arrays or unused Physical Devices are available depending on the RAID Level of the Logical Drive to be created.

- Physical Devices in which S.M.A.R.T. errors are detected cannot be used to create Logical Drives.
- Disk Array which does not have any Logical Drive can not be used to create Logical Drives.

Logical Drive with RAID Level being RAID 0, RAID 1, RAID 5 or RAID 6

Disk Arrays containing empty areas or unused Physical Devices are available for creating a Logical Drive with the RAID Level being RAID 0, RAID 1, RAID 5, or RAID 6.
Among empty areas in a Disk Array, the empty area existing at the end of the Disk Array can be used. The RAID Level of a Logical Drive to be created must be the same as that of the Logical Drives existing in the area used on the Disk Array.
If unused Physical Devices are used, create a Disk Array and create a Logical Drive on it. Unused Physical Devices are those with their [Status] being [Ready].

Logical Drive with RAID Level being RAID 10 or RAID 50

Only unused Physical Devices are available for Logical Drives with RAID Level being RAID 10 or RAID 50. Unused Physical Devices are those with their [Status] being [Ready].

Creating Logical Drives by "Create Logical Drive - Custom Mode"

This section describes the information on Logical Drives to be created by "Create Logical Drive - Custom Mode".

RAID Levels

The RAID Level of a Logical Drive which can be created by "Create Logical Drive - Custom Mode" should be RAID 0, RAID 1, RAID 5, RAID 6, RAID 10, or RAID 50.

Supported RAID Levels vary in RAID Controllers. Unsupported RAID Levels cannot be selected.

Capacity of Logical Drive

A Logical Drive to be created in the Custom Mode can have any capacity. However, a Logical Drive with the RAID Level being RAID 10 or RAID 50 must be created by using the entire areas of Physical Devices.

Items set for Logical Drive

The values of other selection items set for a Logical Drive to be created are defined as shown in the table below.

Selection Item	Value
Stripe Size	Select a value out of 1KB, 2KB, 4KB, 8KB, 16KB, 32KB, 64KB, 128KB, 256KB, 512KB, and 1024KB.
Cache Mode	Three possible values are as follows: Auto Switch: Switches the mode automatically between Write Back and Write Through depending on the existence and/or status of battery. Write Back: Writes data to the cache memory asynchronously. Write Through: Writes data to the cache memory synchronously.
Initialization Mode	Two possible values are as follows: Full: Initializes both the management and data areas in the Logical Drive. Quick: Initializes only the management information in the Logical Drive.

Supported Stripe Sizes and cache mode vary in RAID Controllers. Unsupported Stripe Sizes and cache modes cannot be selected.

Deleting Logical Drive

The Universal RAID Utility can delete a Logical Drive becoming unnecessary.

The function of deleting a Logical Drive is available only in the Advanced Mode.

- Before a Logical Drive is deleted, check if the Logical Drive contains required data. Deleting a Logical Drive causes all the data saved in the Logical Drive to be lost.

Any Logical Drive meeting the following conditions cannot be deleted.

- Containing the some partitions. But, you can delete a Logical Drive which [State] is [Offline].
- In case of the operating system is Windows, use the Logical Drive (Disk) as the Dynamic Disk. Change to the Basic Disk to delete the Logical Drive.
- In case of the operating system is Linux, the LVM partition exists in the Logical Drive when use the LVM. Delete the LVM partition to delete the Logical Drive.
- Located at other than the end of Disk Array.

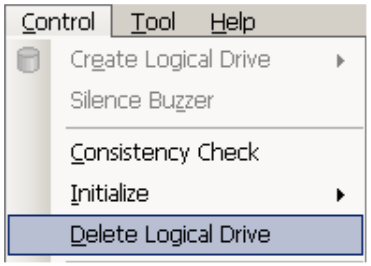
Deleting Logical Drive

The procedure of deleting a Logical Drive is described below.

RAID Viewer

Use [Delete Logical Drive] in [Control] menu.

Step 1 Start the RAID Viewer. Click the Logical Drive to be deleted on the Tree View. Click [Delete Logical Drive] on the pull-down menu of menu item [Control].



raidcmd

Use "**delld**" command.

Step 1 Execute "**delld**" command with the following parameters.

- Number of the RAID Controller containing the Logical Drive to be deleted
- Number of the Logical Drive to be deleted

```
> raidcmd delld -c=1 -l=2
Delete Logical Drive #2

Do you continue ? [yes(y) or no(n)] : yes
>
```

1

Maintenance of RAID System

This chapter describes the maintenance of a RAID System using the Universal RAID Utility.

Providing Patrol Read for Physical Devices

The Patrol Read function reads data saved in all Physical Devices in a RAID System entirely to check whether a read error occurs or not repeatedly in the background. The Patrol Read is effective to find failures including Physical Device media errors early. Be sure to execute Patrol Read for a RAID Controller if it supports the Patrol Read.
The interval time of Patrol Read decides by the kind of RAID Controller. See the document of the RAID Controller about the interval time of Patrol Read. The Universal RAID Utility can not change it.
The Universal RAID Utility provides the function of indicating whether Patrol Read is executed or not and the function of changing the Patrol Read Priority.

Setting Whether Patrol Read Is Executed or Not

Whether Patrol Read is executed or not should be set in RAID Controllers. The procedure of setting whether Patrol Read is executed or not is described below.

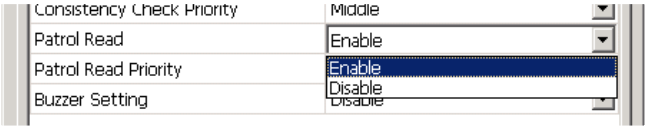
> **IMPORTANT** **Changing the setting whether Patrol Read is executed or not is available only in the Advanced Mode.**

RAID Viewer

Change the property of RAID Controller.

Step 1 Start the RAID Viewer. Click a RAID Controller on the Tree View. Then click [Properties] on the pull-down menu of menu item [File].

Step 2 Click the [Options] tab in the [RAID Controller Properties] dialog box. Change the value of [Patrol Read] to [Enable] or [Disable]. Click [OK] or [Apply].



> **TIPS** RAID Controllers of some types may not support Patrol Read. If the Patrol Read is not supported, items [Patrol Read] and [Patrol Read Priority] on the [Options] tab do not appear.

raidcmd

Use "**optctrl**" command.

Step 1 Execute "**optctrl**" command with -pr option and the following parameters.

```
> raidcmd optctrl -c=1 -pr=enable ●▪▪▪▪ 1
>
```

- Number of the RAID Controller for which whether Patrol Read is executed or not is set
- Enable/Disable Patrol Read.

Step 2 Check the execution result by using "**property**" command.

Checking Result of Executing Patrol Read

You can find the result of executing Patrol Read by checking the RAID Log of the Universal RAID Utility. When detects something problem, Universal RAID Utility records the log in the RAID Log.

Setting Patrol Read Priority

You can set the priority in which Patrol Read is executed in your computer. The procedure of setting the Patrol Read Priority is described below.

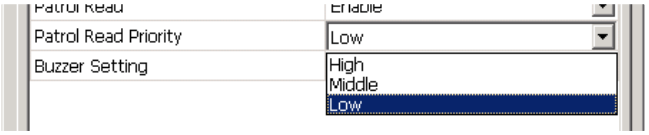
Changing the priority of Patrol Read is available only in the Advanced Mode.

RAID Viewer

Change the property of RAID Controller on RAID Viewer.

Step 1 Start the RAID Viewer. Click the RAID Controller on the Tree View. Then click [Properties] on the pull-down menu of menu item [File].

Step 2 Click the [Options] tab in the [RAID Controller Properties] dialog box. Change the value of [Patrol Read Priority] to [High], [Middle], or [Low]. Click [OK] or [Apply].



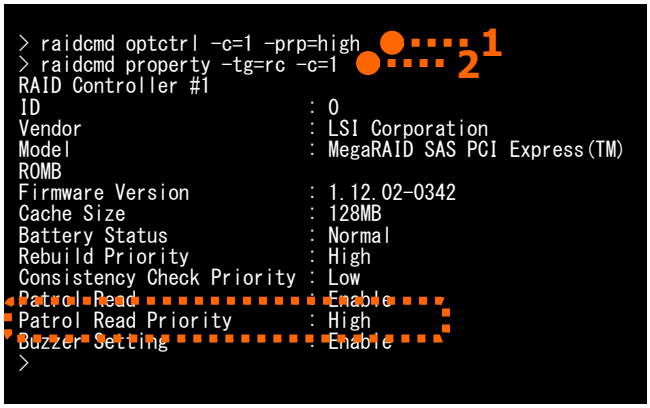
raidcmd

Use "**optctrl**" command.

Step 1 Execute "**optctrl**" command with -prp option and the following parameters.

- Number of the RAID Controller for which Patrol Read Priority is set
- Value set after Patrol Read Priority is changed(Select a value out of high, middle, and low)

Step 2 Check the execution result by using "**property**" command.



Checking Logical Drive Consistency

The Consistency Check function checks the consistency between the data in the data area of a Logical Drive and the parity. The Universal RAID Utility can start or stop Consistency Check and change the priority in which Consistency Check is executed.
The Consistency Check is effective next to Patrol Read to find failures including Physical Device media errors early. Execute Consistency Check periodically if the RAID Controller does not support Patrol Read. If the Universal RAID Utility is installed, routine execution of the Consistency Check is set for RAID Controllers not supporting Patrol Read.

> **IMPORTANT** **Starting or stopping the Consistency Check is enabled both in the Standard Mode and Advanced Mode. The function of changing the priority at which the Consistency Check is executed is available only in the Advanced Mode.**

Executing Consistency Check Manually

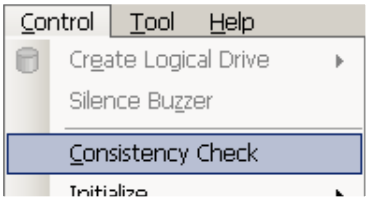
Consistency Check is executed in Logical Drives. The procedure of starting Consistency Check is described below.

> **TIPS** The Consistency Check can be executed only for Logical Drives with [Status] being [Online].
> The Consistency Check cannot be executed for Logical Drives with RAID Level being RAID 0.

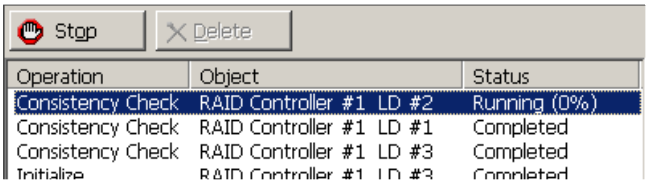
RAID Viewer

Use [Consistency Check] in [Control] menu.

Step 1 Start the RAID Viewer. Click a Logical Drive on the Tree View. Then click [Consistency Check] on the pull-down menu of menu item [Control].



Step 2 After Consistency Check is started, the progress of the Consistency Check appears on the Operation View. At the completion of the Consistency Check, [Status] on the Operation View is changed to [Completed].

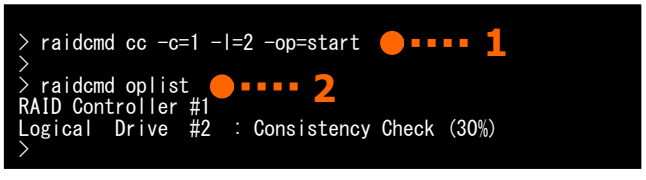


raidcmd

Use "**cc**" command.

Step 1 Execute "**cc**" command with -op option and the following parameters.

- Number of the RAID Controller containing the Logical Drive for which Consistency Check is executed
- Number of the Logical Drive for which Consistency Check is executed



Step 2 After the Consistency Check is started, the raidcmd terminates normally. Check the execution status of the Consistency Check by using "**oplist**" command.

Executing Consistency Check for arbitrary Logical Drive

The Universal RAID Utility makes a task for scheduled execution of Consistency Check so that a RAID Controller not supporting Patrol Read can find failures including media errors early. To execute Consistency Check for arbitrary Logical Drive by raidcmd, use the function of scheduler as Task of Windows or cron of Linux and VMware ESX Server. Universal RAID Utility make the task for a RAID Controller which does not support Patrol Read that execute consistency check for arbitrary Logical Drive.

Tasks provided by Universal RAID Utility (Windows)

The Universal RAID Utility registers a task such as that shown in the table below in a Windows task if it is installed.
The Windows task can be used to change the schedule of executing Consistency Check or delete tasks. For how to use tasks, see the Windows help.

Item	Description
Task name	Consistency Check
Execution day of the week	Wednesday
Starting time	AM 0:00
Execution command	(Universal RAID Utility installation folder)\cli\raidcmd.exe ccs
Execution account	NT AUTHORITY\SYSTEM

Task provided by Universal RAID Utility (Linux、VMware ESX Server)

The Universal RAID Utility registers a task such as that shown in the table below in a Linux cron if it is installed.
The functions of cron can be used to change the schedule of executing Consistency Check or delete tasks. For how to use cron, see the cron(8)、crontab(1)、crontab(5) by "man" command.

Item	Description
Execution day of the week	Wednesday
Starting time	AM 0:00
Execution command	/opt/nec/raidcmd/raidcmd ccs
Execution account	root

Executing Consistency Check for all Logical Drives for RAID Controller not supporting Patrol Read

To execute Consistency Check for all Logical Drives of a RAID Controller not supporting Patrol Read, use "**ccs**" command of the raidcmd.

Stopping Consistency Check

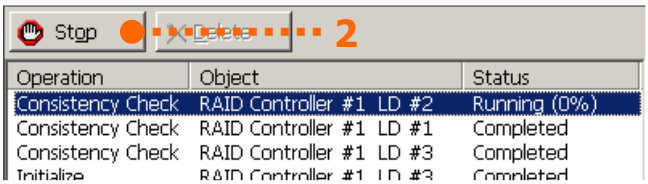
You can stop Consistency Check being executed on the way. The procedure of stopping Consistency Check is described below.

RAID Viewer

Use [Stop] on Operation View.

Step 1 Start the RAID Viewer. See [Operation View] while Consistency Check is executed.

Step 2 Click operation [Consistency Check] which you want to stop. Click [Stop] on the Operation View. After the Consistency Check is stopped, [Status] on the Operation View is changed to [Stopped].



raidcmd

Use "**cc**" command.

Step 1 Execute "**cc**" command with -op option and the following parameters.

- Number of the RAID Controller containing the Logical Drive for which Consistency Check is stopped
- Number of the Logical Drive for which Consistency Check is stopped

Step 2 After the Consistency Check is stopped, the raidcmd terminates normally. The stopped Consistency Check disappears from the list of "**oplist**" command.

Checking Result of Executing Consistency Check

You can find the result of executing Consistency Check by checking the RAID Log of the Universal RAID Utility. Detecting a problem, the Consistency Check records the log in the RAID Log.

Setting Consistency Check Priority

You can set the priority at which Consistency Check is executed in the computer. The procedure of setting the Consistency Check Priority is described below.

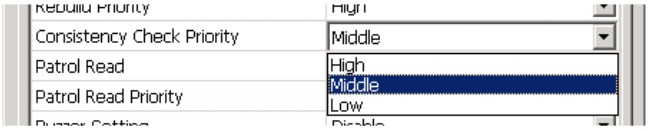
Setting Consistency Check Priority are available only in the Advanced Mode.

RAID Viewer

Change the property of RAID Controller.

Step 1 Start the RAID Viewer. Click the RAID Controller on the Tree View. Then click [Properties] on the pull-down menu of menu item [File].

Step 2 Click the [Options] tab in the [RAID Controller Properties] dialog box. Change the value of [Consistency Check Priority] to [High], [Middle], or [Low]. Click [OK] or [Apply].



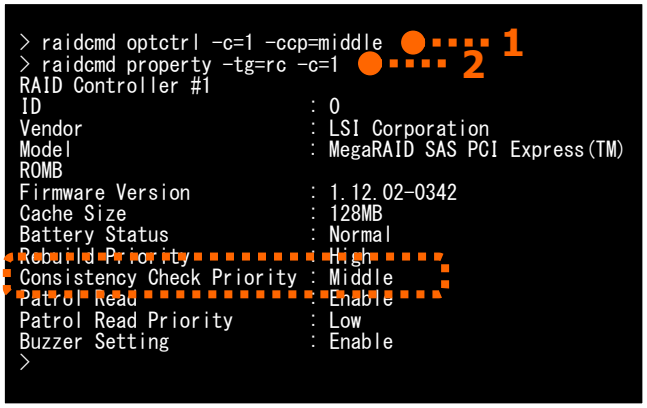
raidcmd

Use "**optctrl**" command.

Step 1 Execute "**optctrl**" command with -ccp option and the following parameters.

- Number of the RAID Controller for which Consistency Check Priority is set
- Value set after Consistency Check Priority is set(Select a value out of high, middle, and low)

Step 2 Check the execution result by using "**property**" command.



Initializing Logical Drive

The Initialize writes 0s into the entire area of a Logical Drive to erase the data saved in the Logical Drive. Use the function when you want to erase the data saved in a Logical Drive fully.
Initialization has two modes listed in the table below.

Mode	Description
Full	Writes 0s into the entire area of a Logical Drive to erase the data fully.
Quick	Writes 0s into some blocks in a Logical Drive. Only erases OS installation and partition management information. Initialization of the mode is completed earlier than that of the full mode. However, because 0s are not written into the remaining area, data consistency is not held in the Logical Drive.

Initialize are available only in the Advanced Mode.

The Consistency Check of a Logical Drive initialized in the quick mode causes a data inconsistency error to occur due to no data consistency.

The Logical Drive containing the partition cannot be initialized.

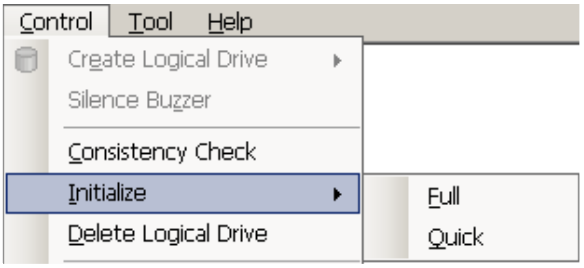
Executing Initialization

Initialization should be executed in Logical Drives. The procedure of executing Initialize is described below.

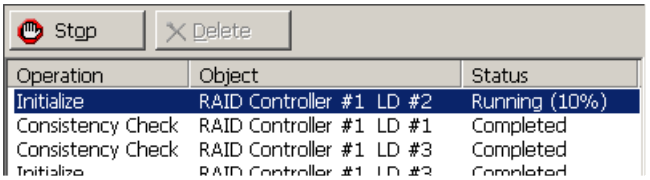
RAID Viewer

Use [Initialize] in [Control] menu.

Step 1 Start the RAID Viewer. Click a Logical Drive on the Tree View. Select [Initialize] on the pull-down menu of menu item [Control] and click [Full] or [Quick].



Step 2 After Initialize is started, the progress of the Initialize appears on the Operation View.
At the completion of the Initialize, [Status] on the Operation View is changed to [Completed].



raidcmd

Use "**init**" command.

Initialization cannot be executed for any Logical Drive with [Status] being [Online].

Step 1 Execute "**init**" command with -op option and the following parameters.

- Number of the RAID Controller containing the Logical Drive to be initialized
- Number of the Logical Drive to be initialized

```
> raidcmd init -c=1 -l=2 -op=start ●···· 1
>
> raidcmd oplist ●···· 2
RAID Controller #1
Logical  Drive  #2  : Initialize (50%)
>
```

Step 2 After the Initialize is started, the raidcmd terminates normally. Check the execution status of the Initialize by using "**oplist**" command.

Stopping Initialization

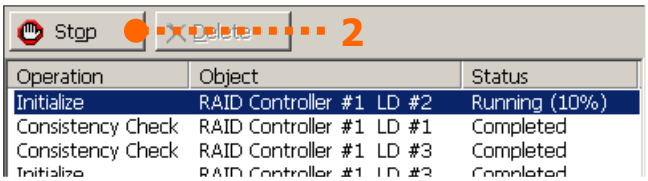
You can stop Initialize being executed on the way. The procedure of stopping Initialize is described below.

RAID Viewer

Use [Stop] on Operation View.

Step 1 Start the RAID Viewer. See [Operation View] while Initialize is executed.

Step 2 Click operation [Initialize] which you want to stop. Then click [Stop] on the Operation View. After the Initialize is stopped, [Status] on the Operation View is changed to [Stopped].



raidcmd

Use "**init**" command.

Step 1 Execute "**init**" command with -op option and the following parameters.

- Number of the RAID Controller containing the Logical Drive for which Initialize is stopped
- Number of the Logical Drive for which Initialize is stopped

```
> raidcmd init -c=1 -l=2 -op=stop ●···· 1
>
> raidcmd oplist ●···· 2
>
```

Step 2 After the Initialize is stopped, the raidcmd terminates normally. The stopped Initialize disappears from the list of "**oplist**" command.

Checking Result of Executing Initialization

You can find the result of executing Initialize by checking the RAID Log of the Universal RAID Utility. Detecting a problem, the Initialize records the log in the RAID Log.

Setting Initialization Priority

You can set the priority at which Initialization is executed in the computer. The procedure of setting the Initialization Priority is described below.

Setting Initialization Priority are available only in the Advanced Mode.

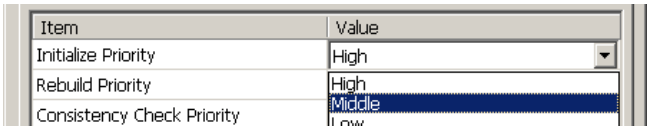
RAID Controllers of some types may not support the setting Initialization Priority. If does not support this function, RAID Viewer and raidcmd do not display this item in the property of RAID Controller and the execution of "**optctrl**" command of raidcmd fails.

RAID Viewer

Change the property of RAID Controller.

Step 1 Start the RAID Viewer. Click the RAID Controller on the Tree View. Then click [Properties] on the pull-down menu of menu item [File].

Step 2 Click the [Options] tab in the [RAID Controller Properties] dialog box. Change the value of [Initialization Priority] to [High], [Middle], or [Low]. Click [OK] or [Apply].



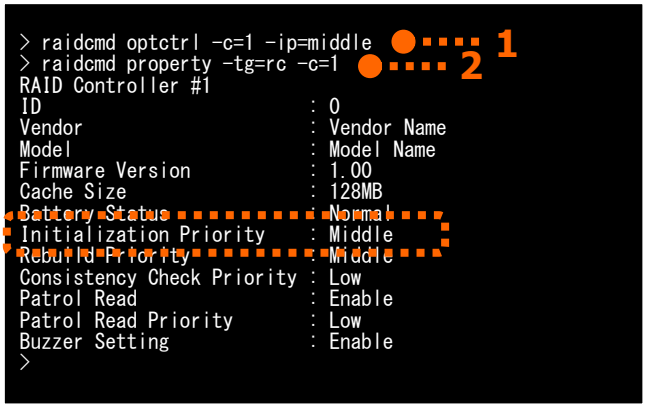
raidcmd

Use "**optctrl**" command.

Step 1 Execute "**optctrl**" command with -ip option and the following parameters.

- Number of the RAID Controller for which Initialization Priority is set
- Value set after Initialization Priority is set(Select a value out of high, middle, and low)

Step 2 Check the execution result by using "**property**" command.



Rebuilding Physical Device

Rebuild means incorporation of a new Physical Device to a Logical Drive after a Physical Device is replaced with the new one due to occurrence of an event such as a failure. In general, the Rebuild is automatically started by a function of the RAID Controller called standby rebuild or hot-swap rebuild. Accordingly, manual Rebuild is not required so often. If required, use the Universal RAID Utility.

> **Manual Rebuild is available only in the Advanced Mode.**

Executing Rebuild

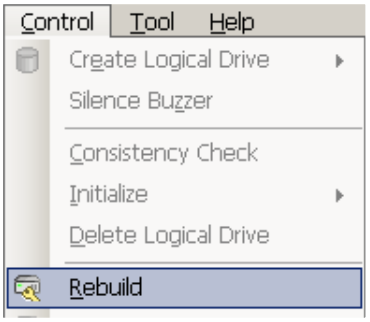
Rebuild is executed for a Physical Device. The procedure of executing Rebuild is described below.

RAID Viewer

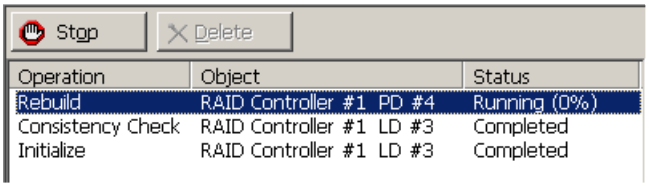
Use [Rebuild] in [Control] menu.

Step 1 Connect the Physical Device used for Rebuild to a RAID Controller at this timing if required. If the Physical Device is connected completely, start the RAID Viewer.

Step 2 Click the Physical Device used for the Rebuild on the Tree View. Then click [Rebuild] on the pull-down menu of menu item [Control].



Step 3 After the Rebuild is started, the progress of the Rebuild appears on the Operation View. At the completion of the Rebuild, [Status] on the Operation View is changed to [Completed].



raidcmd

Use "**rebuild**" command.

> Rebuild can be executed if [Status] of a Physical Device is set to [Failed] and [Status] of the Logical Drive using the physical drive is set to [Degraded].

Step 1 Connect the Physical Device used for Rebuild to a RAID Controller at this timing if required.

Step 2 Execute "**rebuild**" command with -op option and the defined parameters.

- Number of the RAID Controller containing the Physical Device for which Rebuild is executed
- Number of the Physical Device for which Rebuild is executed

```
> raidcmd rebuild -c=1 -p=3 -op=start ●···· 1
>
> raidcmd oplist ●···· 2
RAID Controller #1
Physical Device #3(2) : Rebuild (70%)
>
```

Step 3 After the Rebuild is started, the raidcmd terminates normally. Check the execution status of the Rebuild by using "**oplist**" command.

Stopping Rebuild

You can stop Rebuild being executed on the way. The procedure of stopping Rebuild is described below.

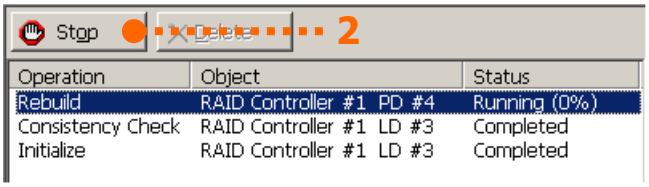
> **The function of stopping Rebuild is available only in the Advanced Mode.**

RAID Viewer

Use [Stop] on Operation View.

Step 1 Start the RAID Viewer. See [Operation View] while Rebuild is executed.

Step 2 Click operation [Rebuild] which you want to stop. Then click [Stop] on the Operation View. After the Rebuild is stopped, [Status] on the Operation View is changed to [Stopped].

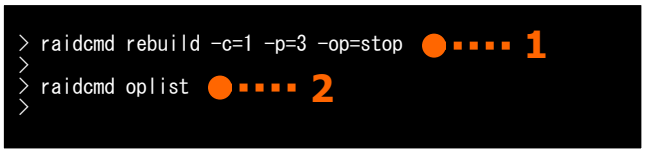


raidcmd

Use "**rebuild**" command.

Step 1 Execute "**rebuild**" command with -op option and the following parameters.

- Number of the RAID Controller containing the Physical Device for which Rebuild is stopped
- Number of the Physical Device for which Rebuild is stopped



Step 2 After the Rebuild is stopped, the raidcmd terminates normally. The stopped Rebuild disappears from the list of "**oplist**" command.

Checking Result of Executing Rebuild

You can find the result of executing Rebuild by checking the Tree View, the property of the Physical Device and the RAID Log of the Universal RAID Utility.
If Rebuild succeeds, the icon of the Physical Device subject to the Rebuild changes to [Online] on the Tree View. In addition, the [Status] in the Property tab of the Physical Device is set to [Online].

When detects something problem, Universal RAID Utility records the log in the RAID Log.

Setting Rebuild Priority

You can set the priority at which Rebuild is executed in the computer. The procedure of setting the Rebuild Priority is described below.

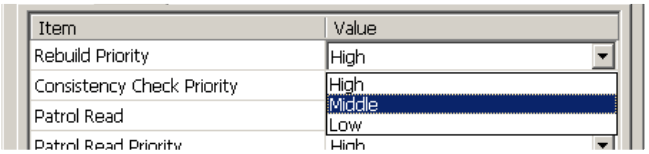
> **Setting Rebuild Priority are available only in the Advanced Mode.**

RAID Viewer

Change the property of RAID Controller.

Step 1 Start the RAID Viewer. Click the RAID Controller on the Tree View. Then click [Properties] on the pull-down menu of menu item [File].

Step 2 Click the [Options] tab in the [RAID Controller Properties] dialog box. Change the value of [Rebuild Priority] to [High], [Middle], or [Low]. Click [OK] or [Apply].



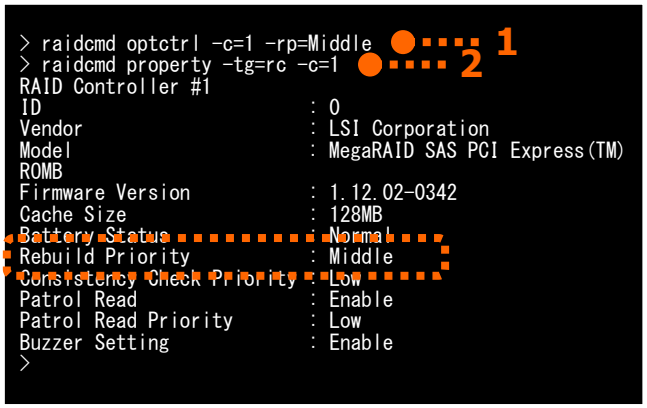
raidcmd

Use "**optctrl**" command.

Step 1 Execute "**optctrl**" command with -rp option and the defined parameters.

- Number of the RAID Controller for which Rebuild Priority is set
- Value set after Rebuild Priority is set(Select a value out of High, Middle, and Low)

Step 2 Check the execution result by using "**property**" command.



Checking Location of Physical Device

The locate function can be used when you want to know the slot to which a specific Physical Device appearing in the RAID Viewer is inserted in the computer or enclosure. In actual, locate turns on the DISK lamp on the computer or enclosure in which the specified Physical Device is installed. (The DISK lamp blinks depending on the types of the computer or enclosures.) Searching for the Physical Device with the DISK lamp being ON allows the Physical Device for which "check location" is executed on the RAID Viewer and raidcmd to be identified. The DISK lamp automatically is turned off in 3 minutes. Also, the RAID Controller may have the Turn off function according to the kind of RAID Controller.

IMPORTANT

RAID Viewer and raidcmd don't support the indication of the status (ON or OFF) of DISK lamp. Therefore, you can't recognize the location of the Physical Device when you turn ON the lamp of two or more Physical Devices at same time. You should turn ON the lamp of Physical Device one by one. It is convenient when you put down the number of the Physical Device which turned on a DISK lamp because you can confirm the number of the Physical Device when turn off the DISK lamp.

Procedure of Checking Location of Physical Device

Locate is executed for a Physical Device. The locate procedure is described below.

RAID Viewer

Use [Locate(Lamp)] in [Control] menu.

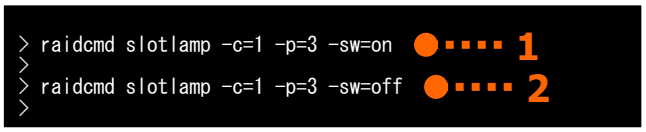
Step 1 Start the RAID Viewer. Click a Physical Device to be located on the tree view, select [Locate (Lamp)] on the pull-down menu of menu item [Control], and click [ON]. Then the DISK lamp on the Physical Device goes on (or blinks depending on the type of the computer). The DISK lamp automatically is turned off in 3 minutes.

Step 2 In case of the RAID Controller with Turn off function, [OFF] of [Locate(Lamp)] in the [Control] menu becomes enable. To turn off the DISK lamp, click a Physical Device to be located on the Tree View, select [Locate (Lamp)] on the pull-down menu of menu item [Control] and click [OFF].

raidcmd

Use "**slotlamp**" command.

Step 1 To turn on the DISK lamp for locate, execute "**slotlamp**" command with the -sw option set to "on" using the following parameters.



- Number of the RAID Controller containing the Physical Device for which its location is checked
- Number of the Physical Device for which its location is checked

Step 2 To turn off the lighting DISK lamp, execute "**slotlamp**" command with the -sw option set to "off".

Changing Status of Physical Device Forcibly

The function of changing status of a Physical Device forcibly can be used when you want to change the [Status] of a Physical Device to [Online] or [Failed] forcibly for a maintenance job or another. The function may not be used in normal operation.

The function of changing the status of a Physical Device forcibly is available only in the Advanced Mode.

The function of changing the status of a Physical Device forcibly may not be able to change the status to the desired one depending on the status of the Physical Device (such as a severe failure).

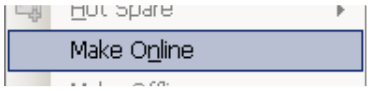
To [Online] Forcibly

To set the [Status] of a Physical Device to [Online] forcibly, use Make Online. The procedure of executing Make Online is described below.

RAID Viewer

Use [Make Online] in [Control] menu.

Step 1 Start the RAID Viewer. Click a Physical Device with [Status] being [Failed] on the Tree View. Then click [Make Online] on the pull-down menu of menu item [Control].
After the Make Online succeeds, [Status] of the Physical Device is changed to [Online].



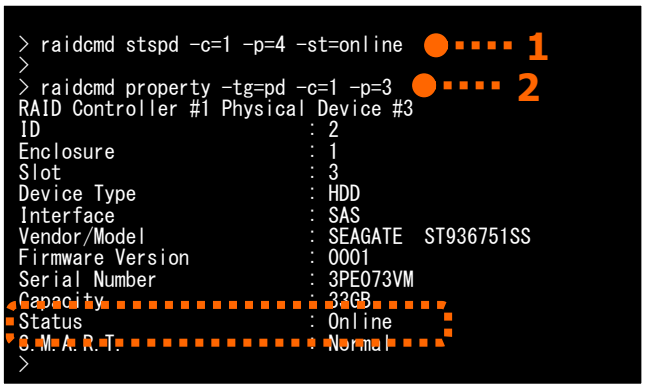
raidcmd

Use "**stspd**" command.

Step 1 Execute "**stspd**" command with -st option and the following parameters.

- Number of the RAID Controller containing the Physical Device with its status set to [Online] forcibly
- Number of the Physical Device with its status set to [Online] forcibly

Step 2 If "**stspd**" command succeeds, the [Status] of the physical device is set to [Online].



To [Failed] Forcibly

To set the [Status] of a Physical Device to [Failed] forcibly, use Make Offline. The procedure of executing Make Offline is described below.

RAID Viewer

Use [Make Offline] in [Control] menu.

Step 1 Start the RAID Viewer. Click a Physical Device with [Status] being [Online] on the Tree View. Then click [Make Offline] on the pull-down menu of menu item [Control].
After the Make Offline succeeds, [Status] of the Physical Device is changed to [Failed].

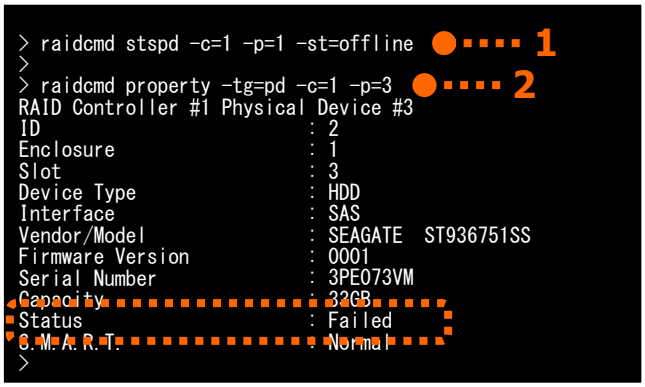
raidcmd

Use "**stspd**" command.

Step 1 Execute "**stspd**" command with -st option and the following parameters.

- Number of the RAID Controller containing the Physical Device with its status set to [Failed] forcibly
- Number of the Physical Device with its status set to [Failed] forcibly

Step 2 If "**stspd**" command succeeds, the [Status] of the physical device is set to [Failed].



Troubleshooting RAID System

The Universal RAID Utility provides various measures to monitor occurrences of failures in the RAID System. The figure below shows the image of the troubleshooting function provided by the Universal RAID Utility.

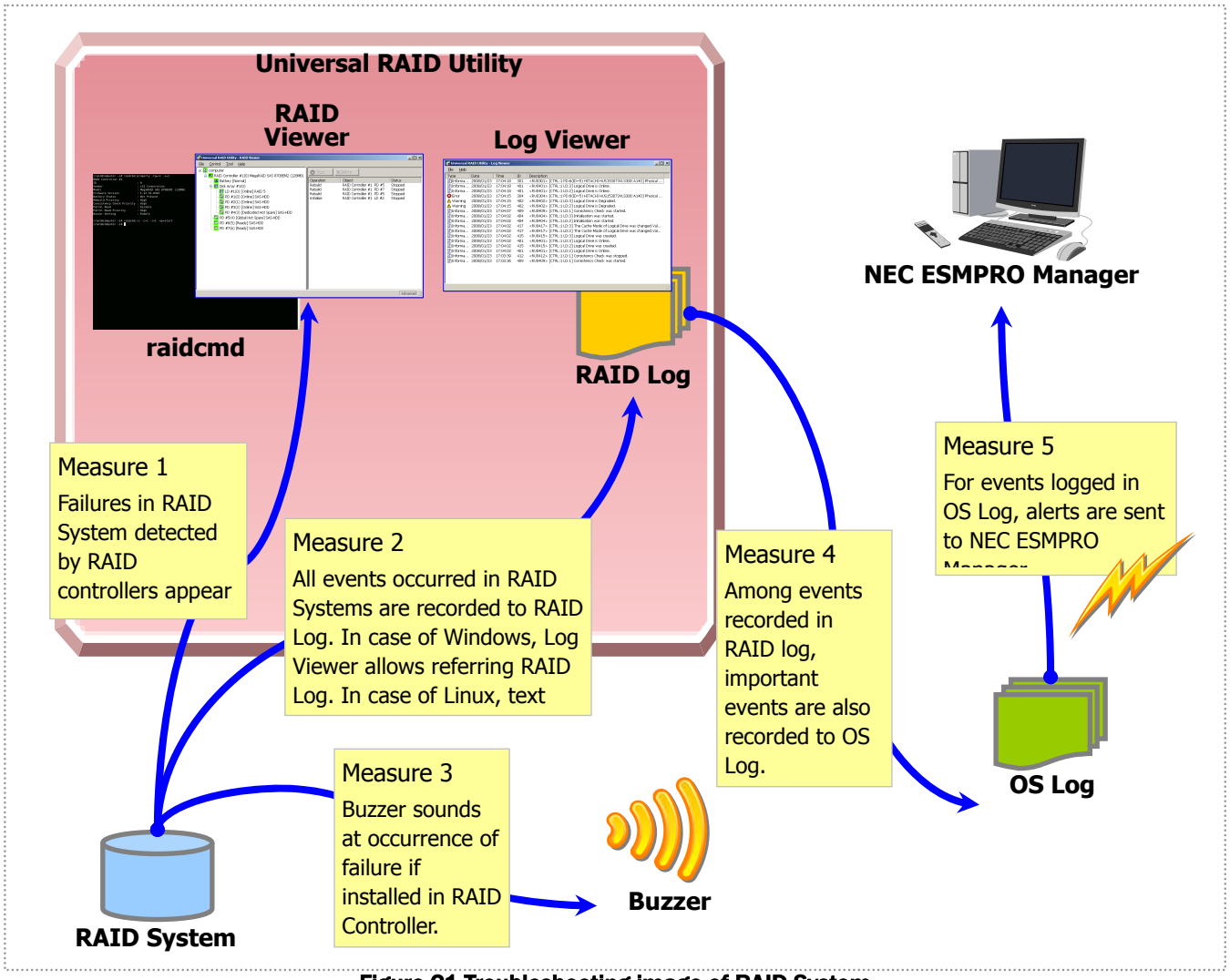

Universal RAID Utility
RAID Viewer
Log Viewer
raidcmd
RAID Log
NEC ESMPRO Manager
Measure 1
Failures in RAID System detected by RAID controllers appear
Measure 2
All events occurred in RAID Systems are recorded to RAID Log. In case of Windows, Log Viewer allows referring RAID Log. In case of Linux, text
Measure 3
Buzzer sounds at occurrence of failure if installed in RAID Controller.
Measure 4
Among events recorded in RAID log, important events are also recorded to OS Log.
Measure 5
For events logged in OS Log, alerts are sent to NEC ESMPRO
OS Log
Buzzer
RAID System

Figure 21 Troubleshooting image of RAID System

This chapter describes the troubleshooting of a RAID System done by using the Universal RAID Utility.

Failure Detection Measures

The Universal RAID Utility provides several fault detection measures as shown in Figure 21 Troubleshooting image of RAID System. The measures are described below.

Status Display by RAID Viewer

The RAID Viewer indicates the status of the RAID System with the icons of components on the Tree View and the [Status] in the Property tab of each component.
For details of the icons of components on the Tree View, see "Tree View".
For details of [Status] in the Property tab, see "Referring to Information on RAID System".

Status Display by raidcmd

You can see the status of each component in a RAID System by using "**property**" command. For the information in the property, see "Referring to Information on RAID System

Logging Events to RAID Log

The Universal RAID Utility logs all events occurred in the RAID System to the RAID Log in the Universal RAID Utility.
In case of Windows, you can see the data in the RAID Log on the Log Viewer. For details of the Log Viewer, see "Functions of Log Viewer".
Also, the data in the RAID Log can be seen by using a text editor or otherwise. Note the character code when you see the RAID Log.

Operating System	Path and File Name	Character Code
Windows	(installed folder)/server/raid.log	UTF-8
Linux, VMware ESX Server	/var/log/raidsrv/raid.log	UTF-8

For details of events to be registered to the RAID Log, see "Appendix B : Logs/Events".

Buzzer in RAID Controller

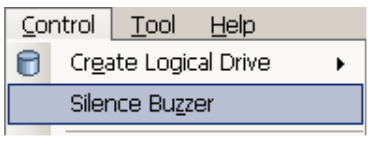
If a RAID Controller is equipped with a Buzzer, the RAID Controller sounds the Buzzer for some types of failures occurred.
The Buzzer sounds until the stopping it by RAID Viewer or raidcmd.

RAID Viewer

Use [Silence Buzzer] in [Control] menu.

Step 1 Start the RAID Viewer. Check the component in which a failure occurs on the Tree View.

Step 2 Click the RAID Controller containing the component in which the failure occurs. The click [Silence Buzzer] on the pull-down menu of menu item [Control].



You can click menu item [Silence Buzzer] whether a Buzzer sounds or not. Nothing is done if no Buzzer sounds.

raidcmd

Use "**sbuzzer**" command.

Step 1 Execute "**sbuzzer**" command with the following parameter.

- Number of the RAID Controller for which Buzzer is stopped

```
> raidcmd sbuzzer -c=1 ●▪▪▪▪ 1
>
```

Logging Events to OS Log

Among RAID System events logged in the RAID Log, the Universal RAID Utility also logs important events to the OS Log. OS Log is the event log(system) in Windows or the syslog in Linux.
For events to be logged in the Windows event log, see "Appendix B : Logs/Events".

Sending Alert to NEC ESMPRO Manager

Among RAID System events logged in the OS Log, the Universal RAID Utility sends important events which may affect the operations and managements of the computer to the NEC ESMPRO Manager as alerts. To send alerts, the event monitoring function provided by the NEC ESMPRO Agent can be used. If the NEC ESMPRO Agent is installed in the computer in which the Universal RAID Utility is installed and alert transmission is set, RAID System events detected by the Universal RAID Utility will be automatically subject to alert transmission to the NEC ESMPRO Manager.
For alerts sent to the NEC ESMPRO Manager, see "Appendix B : Logs/Events".

For alert transmission provided by the NEC ESMPRO Agent, see the relevant documentation of the NEC ESMPRO Agent.

Using report coordination of NEC ESMPRO/AlertManager

To transfer alerts sent to the NEC ESMPRO Manager by using the inter-manager communication function or to use alerts on report coordination of the NEC ESMPRO/AlertManager, add the following registry to the computer in which the NEC ESMPRO Manager is installed.

Registry key

CPU architecture (x86) :
HKEY_LOCAL_MACHINE\SOFTWARE\NEC\NVBASE\AlertViewer\AlertType\URAIDUTL

CPU architecture (x64) :
HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\NEC\NVBASE\AlertViewer\AlertType\URAIDUTL

Values

Name	Type	Data
WavDefault	REG_SZ	Default.wav
AniDefault	REG_SZ	Default.bmp
Image	REG_SZ	Default.bmp
SmallImage	REG_SZ	Default.bmp

Permission

In case of the operation system is Windows XP(exclude Home Edition), Windows 2000, Windows Server 2003, Windows NT, add the following permissions.

Name	Type
Administrators	Full Control
Everyone	Read
SYSTEM	Full Control
ESMPRO User Group	Full Control

ESMPRO User Group is the name group for the management of NEC ESMPRO Manager (specified it when installed NEC ESMPRO Manager). If you forget the name of group, see the following registry key.

CPU architecture (x86) : HKEY_LOCAL_MACHINE\SOFTWARE\NEC\NVBASE

CPU architecture (x64) : HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node \NEC\NVBASE

Value : LocalGroup

Monitoring Faults of Physical Devices

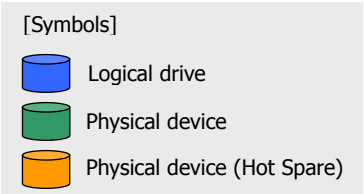
The Universal RAID Utility can take the following measures to monitor failures of Physical Devices detected by RAID Controllers.

RAID Viewer raidcmd	RAID Log	Buzzer	OS Log	Alert
✓	✓	Depending on type of RAID Controller	✓	✓

If a Physical Device used for a Logical Drive is failed, the status of the Physical Device changes to [Failed].
In addition, the status of the Logical Drive using the Physical Device changes to [Degraded] or [Offline] depending on the redundancy. The status of the Physical Device and Logical Device remains unchanged until the problem is solved.

The RAID Viewer indicates the status of Physical Devices and Logical Drives with their icons on the Tree View and their properties. In addition, the RAID Viewer shows the status from the viewpoint of the RAID System and from the viewpoint of the computer on the Tree View.
The raidcmd indicates the status of Physical Devices and Logical Drives on their properties.

The display of the RAID Viewer depending on the change of Physical Device status is described below.



Operation in no failures of Physical Devices

If all Physical Devices used by a Logical Drive operates normally (with their [Status] being [Online]), the Logical Drive is in the online status (with its [Status] being [Online]).

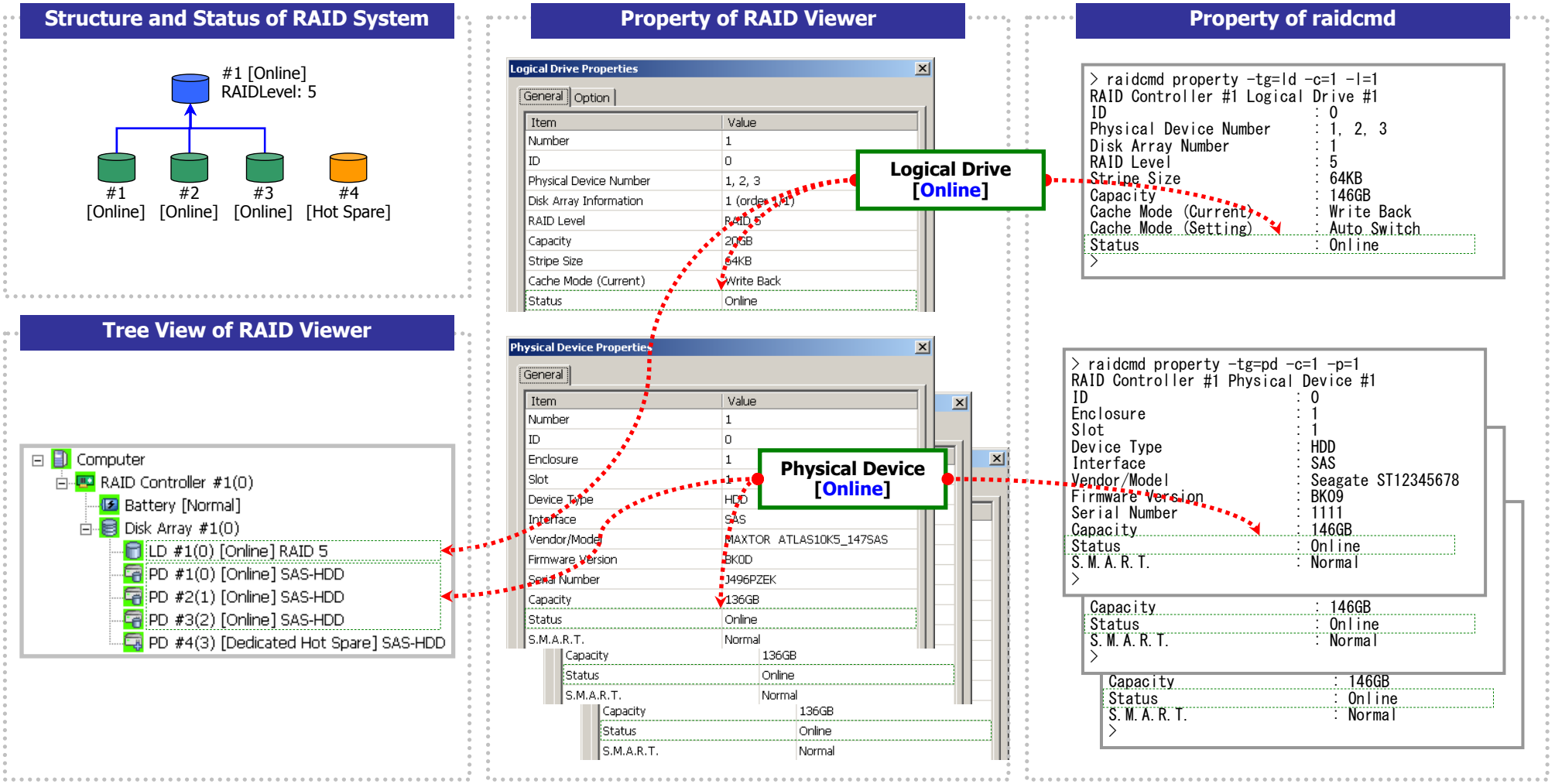


Figure 22 Display of RAID Viewer / raidcmd (No failures of Physical Devices)

Operation when redundancy of Logical Drive degraded or lost due to failure of Physical Device

If one or more Physical Devices used by a Logical Drive are failed (with their [Status] being [Failed]) to degraded (one Physical Device of RAID Level 6 is failed) or lost (one Physical Device of RAID Level 1 or 5 is failed, two Physical Devices of RAID Level 6 is failed) the redundancy of the Logical Drive, the Logical Drive is degraded (with its [Status] being [Degraded]).

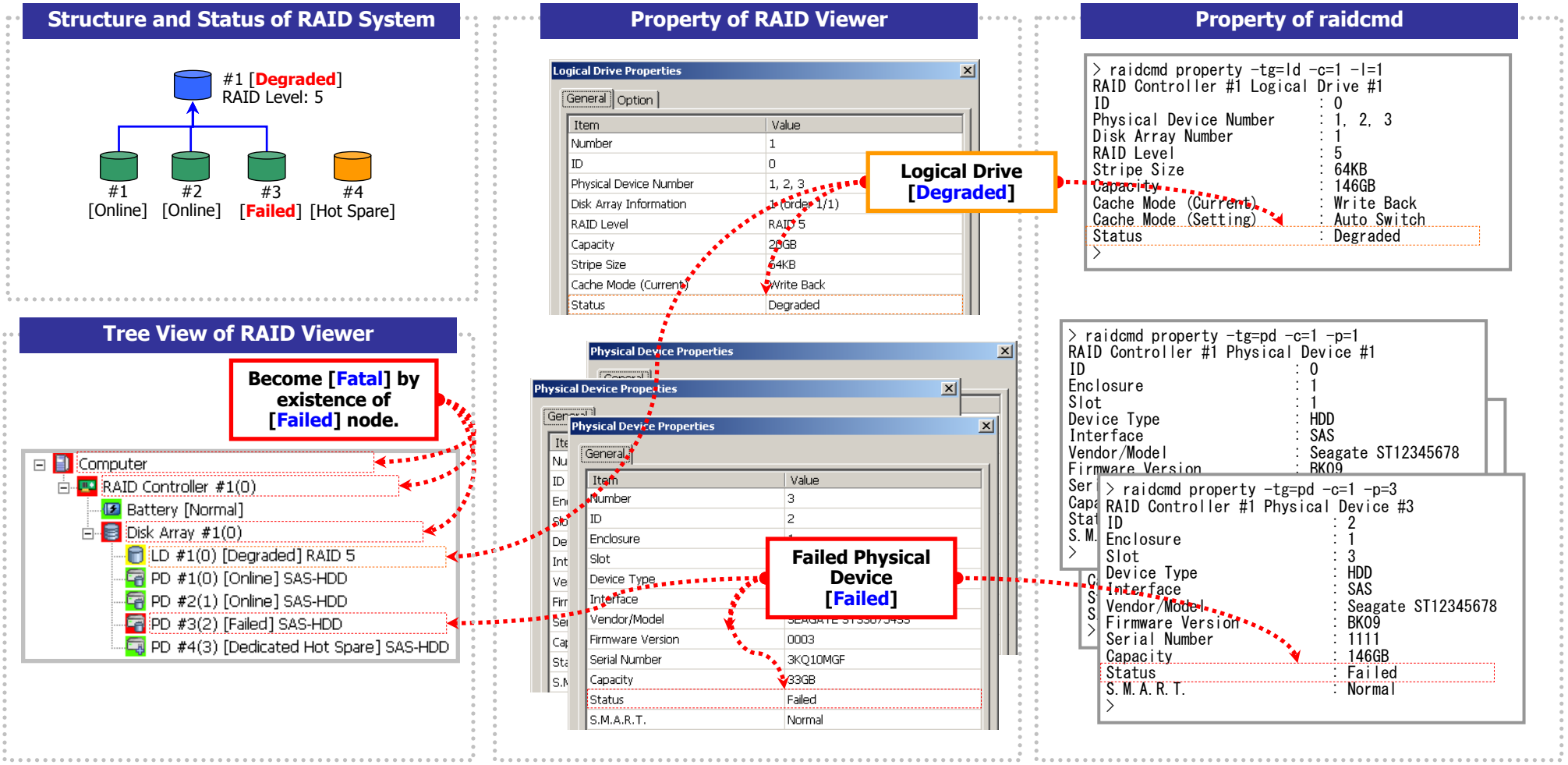


Figure 23 Display of RAID Viewer / raidcmd (Lost the redundancy of Logical Drive)

Operation when failed Physical Device is replaced to recover RAID System

Using the RAID System continuously with the redundancy of a Logical Drive remaining degraded may cause the data in the Logical Drive to be lost when another Physical Device is failed further. Recover a Logical Drive of degraded redundancy by Hot Spare or replacement of the failed Physical Device.
If Hot Spare or replacement of a failed Physical Device operates Rebuild, the status of the Physical Device changes during the rebuilding (with its [Status] changed to [Rebuilding]).

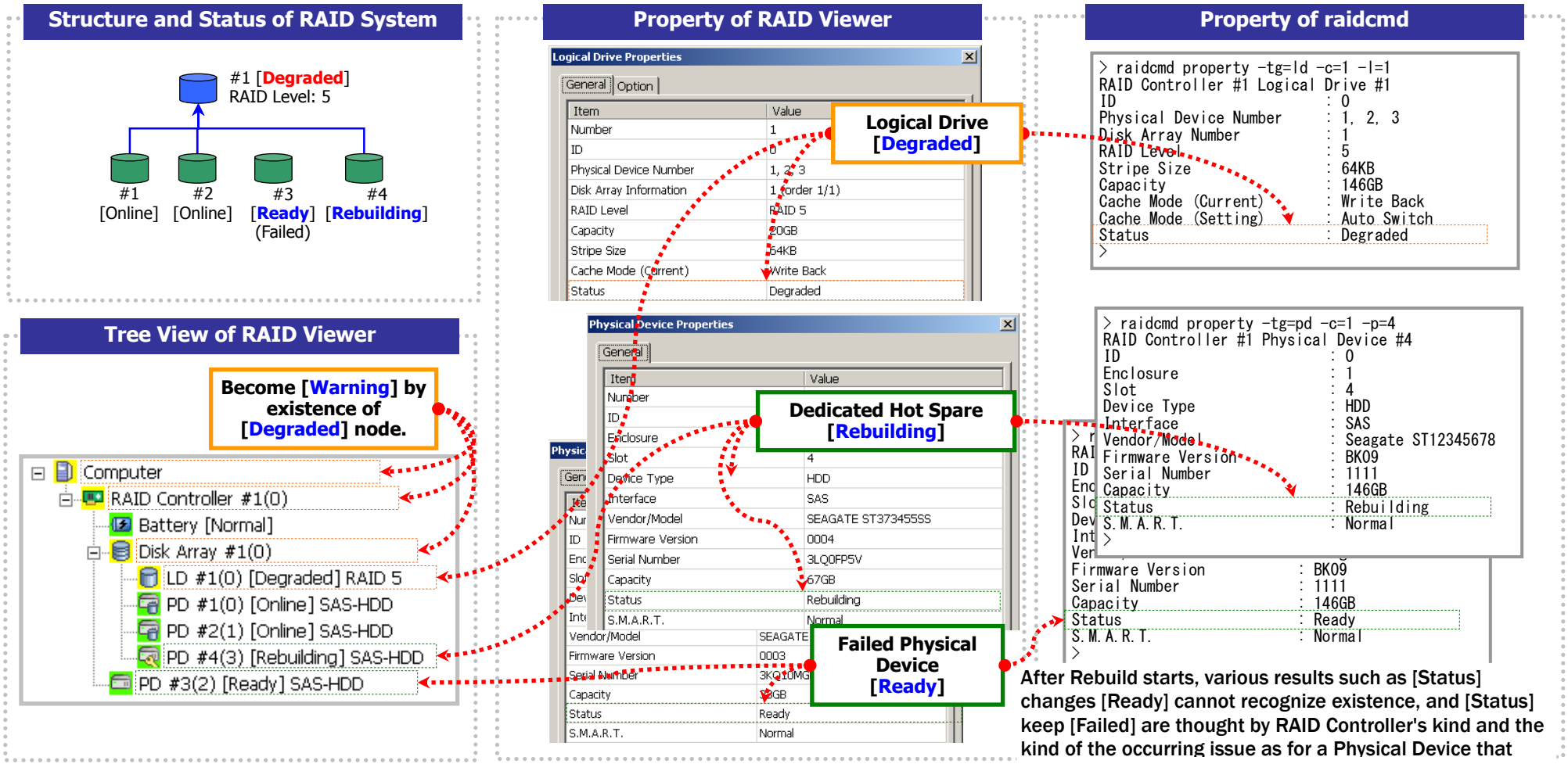


Figure 24 Display of RAID Viewer /raidcmd (Rebuilding of Physical Device)

Operation when the Logical Drive is offline due to failure of Physical Device

If you continue to use the RAID System with lost redundancy of a Logical Drive and another Physical Device is failed further, the redundancy of the Logical Drive is lost completely (two or more Physical Devices of RAID Level 1 or 5 is failed, three or more Physical Devices of RAID Level 6 is failed). The status of a Logical Drive without redundancy is offline (with its [Status] being [Offline]). The data in a Logical Drive in the offline status is lost. Replace all failed Physical Devices and Rebuild the RAID System.

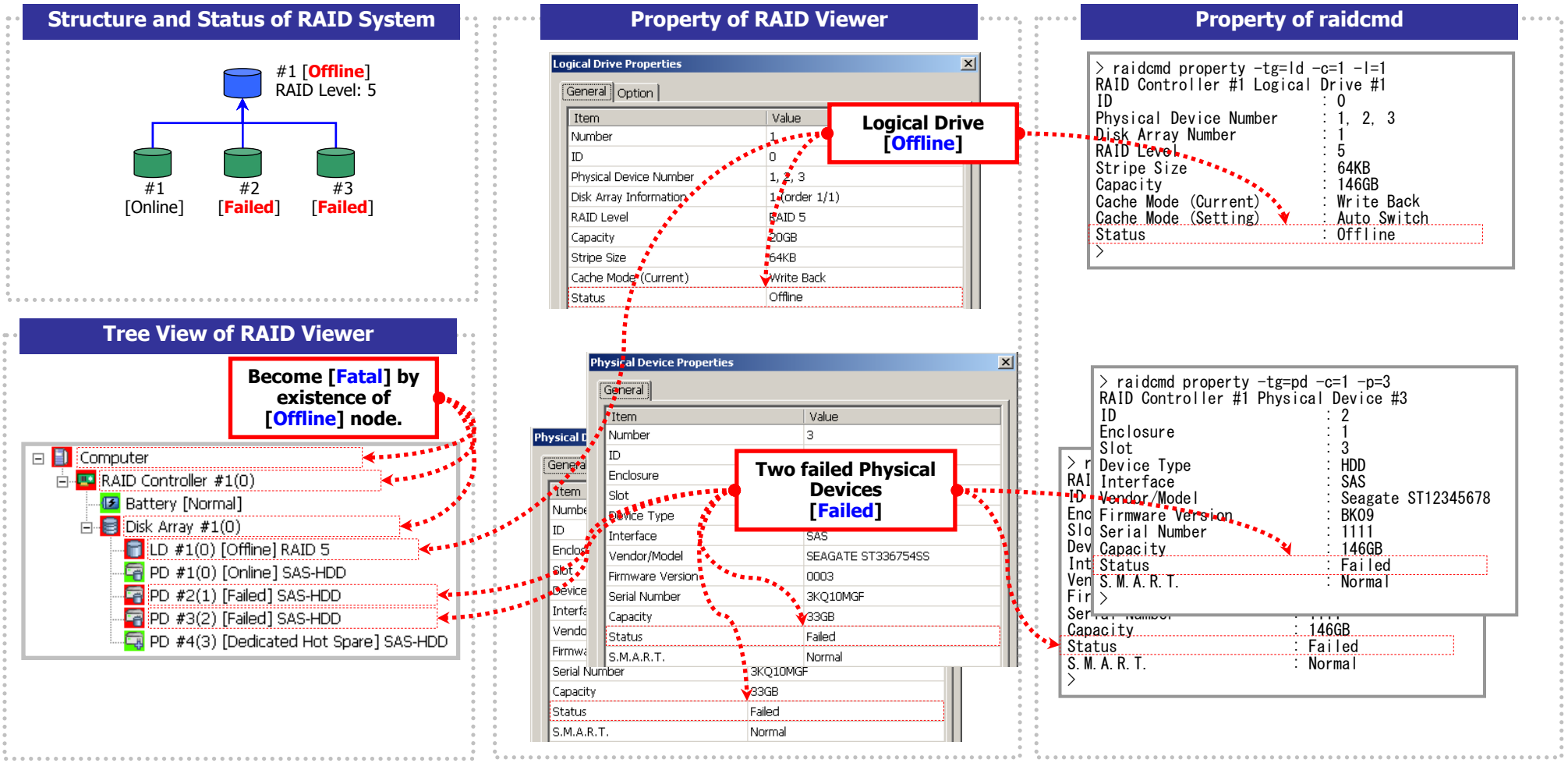


Figure 25 Display of RAID Viewer / raidcmd (Under lost redundancy of Logical Drive)

Monitoring Battery Status

The Universal RAID Utility can monitor battery status which the RAID Controller detects by the following means.

RAID Viewer raidcmd	RAID Log	Buzzer	OS Log	Alert
✓	✓	Depending on type of RAID Controller	✓	✓

The Universal RAID Utility monitors events of the battery installed in the RAID Controller. The Universal RAID Utility logs detected battery events in the RAID Log. Any event indicating occurrence of a problem in the battery reflects to the [Status] of Battery on RAID Viewer and the [Battery Status] of RAID Controller on raidcmd (changes the status to [Warning]). The battery status is retailed until the problem is solved.

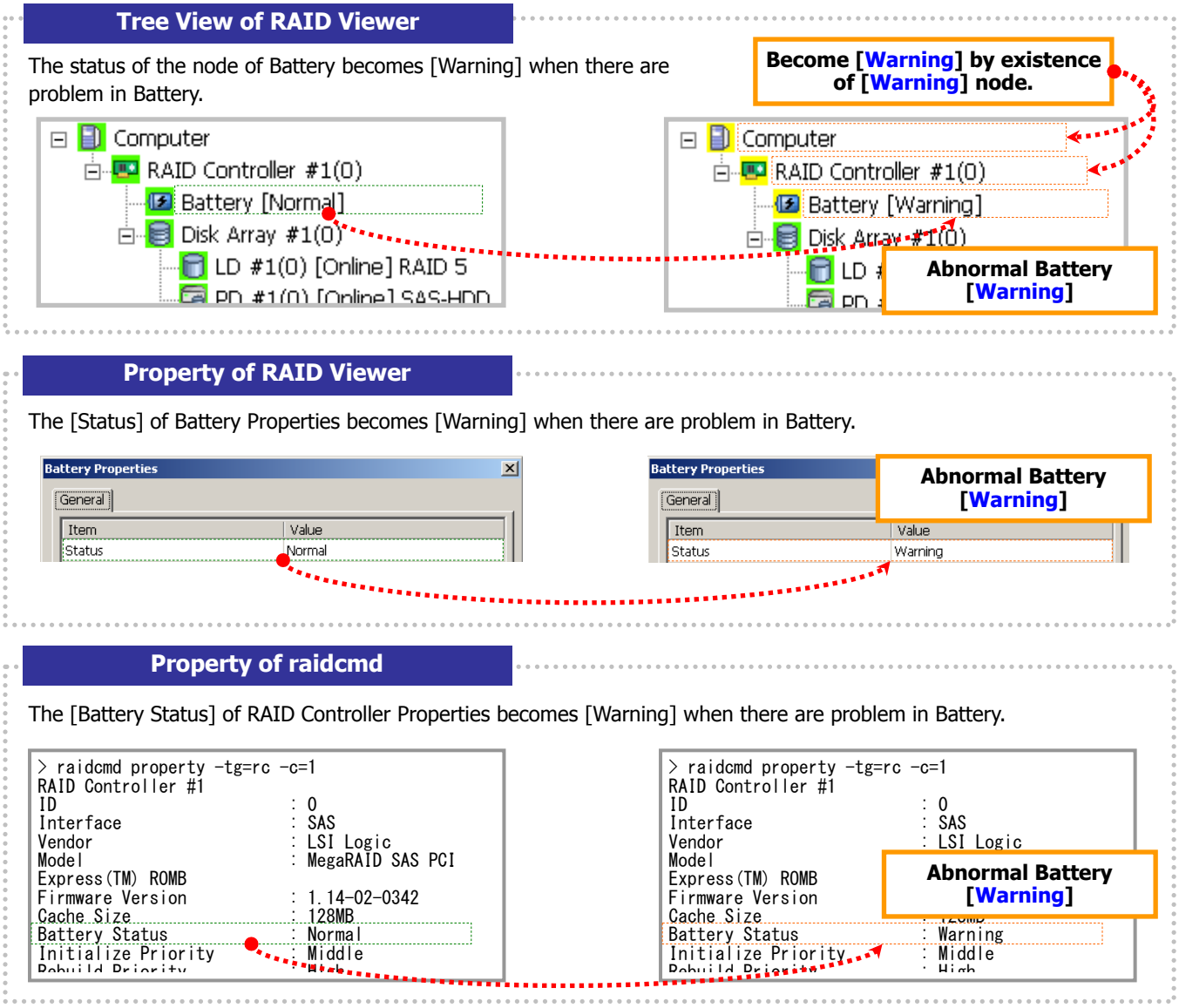


Figure 26 Display of RAID Viewer / raidcmd (Abnormal battery operation)

Monitoring Enclosure Status

The Universal RAID Utility can monitor enclosure status which the RAID Controller detects by the following means.

RAID Viewer raidcmd	RAID Log	Buzzer	OS Log	Alert
	✓	Depending on type of RAID Controller	✓	✓

The Universal RAID Utility monitors events of the enclosure detected by the RAID Controller. The Universal RAID Utility logs detected enclosure events to the RAID Log. In addition, the Universal RAID Utility records important events to the Windows event log and sends alerts to the NEC ESMPRO Manager.
The RAID Viewer and raidcmd do not indicate the severity of events in this category to Tree View and the property of RAID system.

See "Appendix B : Logs/Events" for detail about the event of enclosure.

Monitoring Various Events of RAID System

The Universal RAID Utility can monitor other events which the RAID Controller detects by the following means.

RAID Viewer raidcmd	RAID Log	Buzzer	OS Log	Alert
	✓	Depending on type of RAID Controller	✓	✓

The Universal RAID Utility monitors various events of the RAID System as well as failures of Physical Devices, battery events and enclosure events described above. The Universal RAID Utility logs events detected in the RAID System to the RAID Log. In addition, the Universal RAID Utility records important events to the Windows event log and send alerts to the NEC ESMPRO Manager.
The RAID Viewer and raidcmd do not indicate the severity of events in this category to Tree View and the property of RAID system.

See "Appendix B : Logs/Events" for detail about the various event of RAID system.

Replacing Physical Device for Prevention

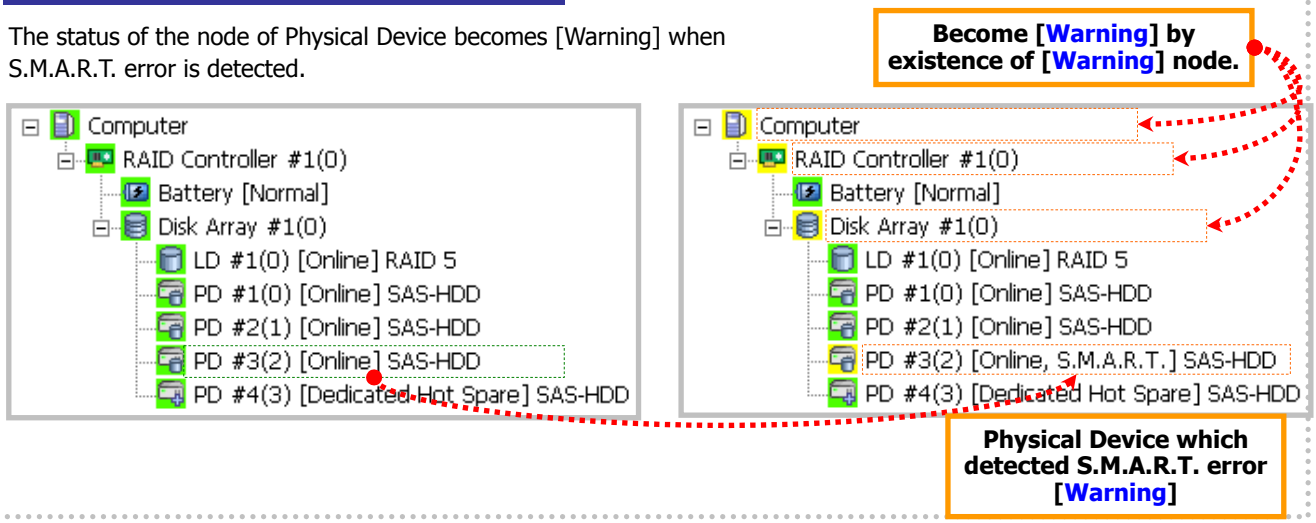
If Physical Devices support S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) and the RAID Controller can detects S.M.A.R.T. errors, the Universal RAID Utility can monitor the S.M.A.R.T. errors by the following means.

RAID Viewer raidcmd	RAID Log	Buzzer	OS Log	Alert
✓	✓	Depending on type of RAID Controller	✓	✓

The Universal RAID Utility monitors S.M.A.R.T. errors occurred in Physical Devices. Detecting a S.M.A.R.T. error, the Universal RAID Utility logs the event to the RAID Log. In addition, the Universal RAID Utility reflects the status of S.M.A.R.T. in a Physical Device as the status of the Physical Device (by changing the status of the Physical Device to [Warning]). The status of the Physical Device is retained as its status until the S.M.A.R.T. error is solved.

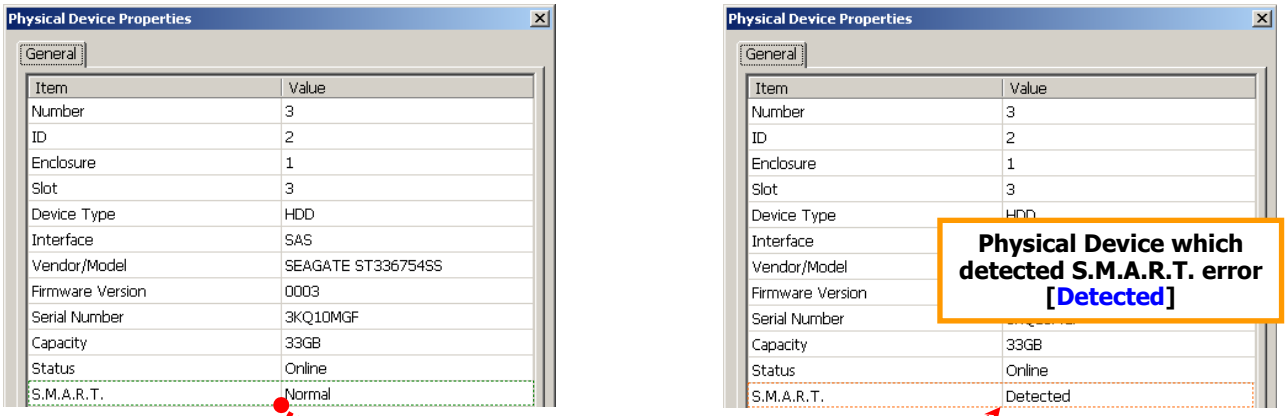
Tree View of RAID Viewer

The status of the node of Physical Device becomes [Warning] when S.M.A.R.T. error is detected.


Become [Warning] by existence of [Warning] node.
Computer
RAID Controller #1(0)
Battery [Normal]
Disk Array #1(0)
LD #1(0) [Online] RAID 5
PD #1(0) [Online] SAS-HDD
PD #2(1) [Online] SAS-HDD
PD #3(2) [Online] SAS-HDD
PD #4(3) [Dedicated Hot Spare] SAS-HDD
Computer
RAID Controller #1(0)
Battery [Normal]
Disk Array #1(0)
LD #1(0) [Online] RAID 5
PD #1(0) [Online] SAS-HDD
PD #2(1) [Online] SAS-HDD
PD #3(2) [Online, S.M.A.R.T.] SAS-HDD
PD #4(3) [Dedicated Hot Spare] SAS-HDD
Physical Device which detected S.M.A.R.T. error [Warning]

Property of RAID Viewer

The [S.M.A.R.T.] of Physical Device Properties becomes [Detected] when S.M.A.R.T. error is detected.



Property of raidcmd

The [S.M.A.R.T.] of Physical Device Properties becomes [Detected] when S.M.A.R.T. error is detected.

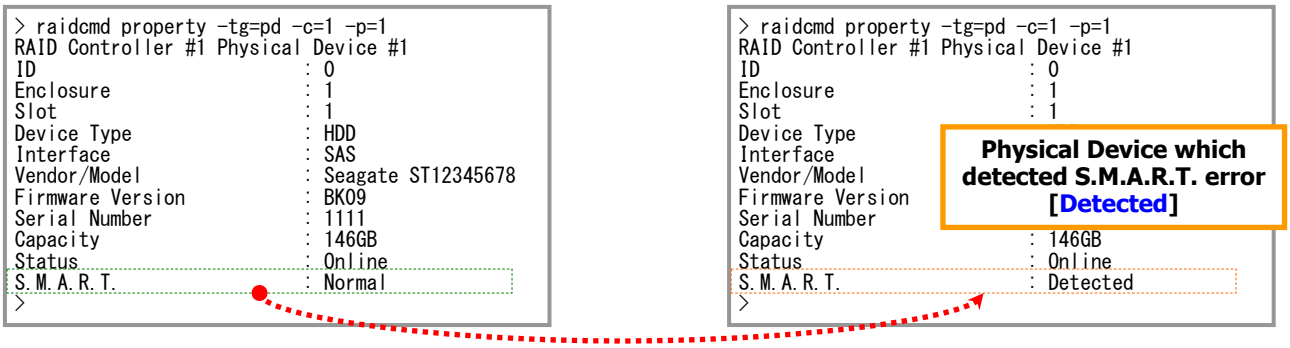


Figure 27 Display of RAID Viewer / raidcmd (Detection of S.M.A.R.T. error)

Changing of Settings of Universal RAID Utility

This chapter describes how to change the settings of the Universal RAID Utility.

Changing TCP port number

If the TCP port number using Universal RAID Utility is same one of other application, you can change the TCP port number using Universal RAID Utility.

> **IMPORTANT** **A user having the administrator authority should change the TCP port number. Only users having the administrator authority can change the TCP port number.**

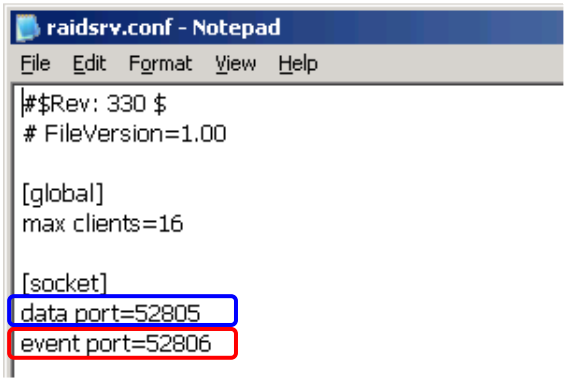
Using Windows as Operating System

Step 1 Log on to the computer as a user having the administrator authority.

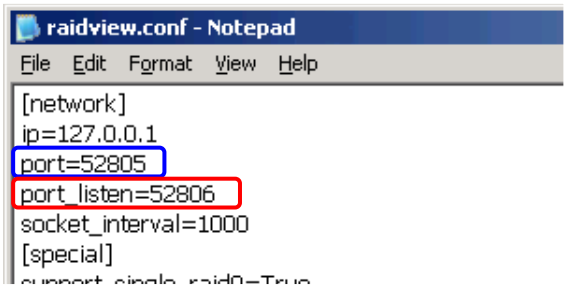
Step 2 Abort the RAID Viewer, Log Viewer, and raidcmd if they are used.

Step 3 Stop raidsrv service. Click [Start] - [Control Panel]. Then double click [Management Tool] - [Services]. Click [raidsrv] service and [Stop] of [Control] menu after displays service list.

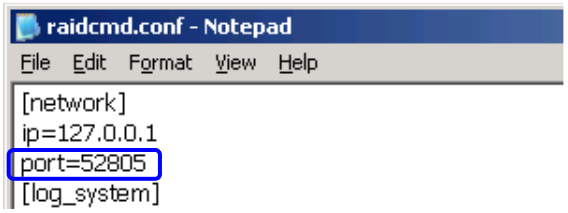
Step 4 First, modify the configuration file of raidsrv service. The configuration file of raidsrv service is (installed folder)\server\raidsrv.conf (the default install folder : %SystemDrive%\Program Files\Universal RAID Utility (x86), %SystemDrive%\Program Files\Universal RAID Utility (x64)). Open this file by text editor, change "data port" and "event port" in [socket] section to new TCP port numbers.



Step 5 Next, modify the configuration file of RAID Viewer. The configuration file of RAID Viewer is (installed folder)\ gui\raidview.conf. Open this file by text editor, change "port" and "port_listen" in [network] section to new TCP port numbers. The value of "port" is same value with "data port" of raidsrv service. The value of "port_listen" is same with "event port" of raidsrv service.



Step 6 Last, modify the configuration file of raidcmd. The configuration file of raidcmd is (installed folder)\cli\raidcmd.conf. Open this file by text editor, change "port" in [network] section to new TCP port number. The value of "port" is same value with "data port" of raidsrv service.



Step 7 If complete to modify three configuration files, start raidsrv service. Click [Start] - [Control Panel]. Then double click [Management Tool] - [Services]. Click [Universal RAID Utility] service and [Start] of [Control] menu after displays service list.

Using Linux or VMware ESX Server as Operating System

Step 1 Log in to the computer as a user having the administrator authority.

Step 2 Abort the raidcmd if it is used.

Step 3 Stop raidsrv service.

Step 4 First, modify the configuration file of raidsrv service. The configuration file of raidsrv service is /etc/opt/nec/raidsrv/raidsrv.conf. Open this file by text editor, change "data port" and "event port" in [socket] section to new TCP port numbers.

Step 5 Next, modify the configuration file of raidcmd. The configuration file of raidcmd is /etc/opt/nec/raidcmd/raidcmd.conf. Open this file by text editor, change "port" in [network] section to new TCP port number. The value of "port" is same value with "data port" of raidsrv service.

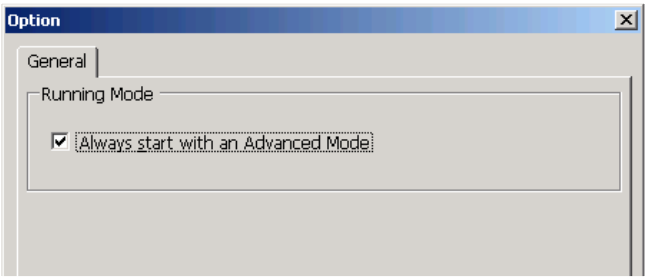
Step 6 If complete to modify three configuration files, start raidsrv service.

Changing Running Mode at Start of RAID Viewer

The RAID Viewer is started in the Standard Mode by default. The setting can be changed so that the RAID Viewer is always started in the Advanced Mode as described below.

Step 1 Click [Option] on the pull-down menu of menu item [Tool].

Step 2 Check the [Always start with an Advanced Mode] check box in the [General] tab of the [Option] dialog box.



TIPS The setting of [Always start RAID Viewer in Advanced Mode] is enabled at the next start of the RAID Viewer.

raidcmd Command Reference

This chapter describes commands of the raidcmd.

cc

[Overview]

Starts or stops Consistency Check.

[Format]

raidcmd **cc** -c=<*controller*> -l=<*logicaldrive*> -op={start|stop}

Command Parameter	Description
-c=<*controller*>	Specify the RAID Controller to be processed. <*controller*> : RAID Controller Number
-l=<*logicaldrive*>	Specify the Logical Drive to be processed. <*logicaldrive*> : Logical Drive Number
-op={start|stop}	Specify whether Consistency Check is started or stopped. start : Starts Consistency Check. stop : Stops Consistency Check.

[Description]

Starts Consistency Check of the specified Logical Drive or stops Consistency Check executed for the specified Logical Drive.

[Condition]

Starting Consistency Check can be provided for a Logical Drive with [Status] being [Online].
Stopping Consistency Check can be provided for a Logical Drive with [Status] being [Online] or [Degraded].

ccs

[Overview]

Starts Consistency Check of Logical Drives in the RAID Controllers in which Patrol Read is not supported.

[Format]

raidcmd **ccs**

[Description]

Starts Consistency Check of Logical Drives in the RAID Controllers in which Patrol Read is not supported.

[Condition]

Consistency check is executed for Logical Drives with [Status] being [Online].

delld

[Overview]

Deletes a Logical Drive.

[Format]

raidcmd **delld** -c=<*controller*> -l=<*logicaldrive*> [-y]

Command Parameter	Description
-c=<*controller*>	Specify the RAID Controller to be processed. <*controller*> : RAID Controller Number
-l=<*logicaldrive*>	Specify the Logical Drive to be processed. <*logicaldrive*> : Logical Drive Number

Command Parameter	Description
[-y]	Deletes the Logical Drive immediately without displaying the message of confirming that the Logical Drive may be deleted.

[Description]

Deletes the specified Logical Drive.

Logical drive allowed to be deleted

If more than one Logical Drive exist in a single Disk Array, only the Logical Drive located at the end of the Disk Array can be deleted. Logical drives at the top and middle of the Disk Array cannot be deleted. The Logical Drive containing the partition cannot be deleted.

Deletion of Disk Array

If deleting the specified Logical Drive causes no Logical Drives to exist in the Disk Array at all, the Disk Array itself will also be deleted.

[Condition]

This command can be executed only in the Advanced Mode.

econfig

[Overview]

Configures a RAID System with a RAID Controller easily.

[Format]

raidcmd **econfig**

[Description]

Executes easy configuration which can automatically configure a RAID System with the specified RAID Controller. For details of the easy configuration, see "Configuring RAID System Easily".

help

[Overview]

Displays the help of raidcmd.

[Format]

raidcmd **help** <*command name*>

Command Parameter	Description
<*command name*>	Specify the command name to see the help. If command name is omitted, displays the list of command.

[Description]

Displays the description of each command of raidcmd. If don't specify the command name as command parameter, displays the list of all of command.

hotspare

[Overview]

Makes or removes a Hot Spare.

[Format]

raidcmd **hotspare** -c=<*controller*> -p=<*physicaldevice*> -mr={make [-a=<*diskarray1*> [,<*diskarrayX*>]] | remove } [-y]

Command Parameter	Description
-c=<*controller*>	Specify the RAID Controller to be processed. <*controller*> : RAID Controller Number
-p=<*physicaldevice*>	Specify the Physical Device to be processed. <*physicaldevice*> : Physical Device Number

Command Parameter	Description
-mr={make [-a=<*diskarray1*>[,<*diskarrayX*>]] | remove}	Specify that a Hot Spare is made or removed. make: Makes a Hot Spare. Depending on whether the -a option exists or not, the type of the Hot Spare to be made varies (Global or Dedicated). Specify Disk Arrays to be subject to hot swap if a Dedicated Hot Spare is made. If the -a option does not exist for making a Hot Spare, a Global Hot Spare will be made with the specified Physical Device. If the -a option exists and Disk Arrays are specified correctly for making a Hot Spare, a Dedicated Hot Spare will be made with the specified Physical Device. <*diskarray1*>, <*diskarrayX*>: Disk Array Numbers remove: Removes a Hot Spare.
[-y]	Changes the status without displaying the message of confirming that the Hot Spare is made or removed.

[Description]

Makes a Global or Dedicated Hot Spare with the specified Physical Device or removes the Hot Spare of the specified Physical Device.

[Condition]

The capacity of the Physical Device to be a Dedicated Hot Spare should be equal to or larger than that of any Physical Device used in the Disk Array.
Dedicated Hot Spares cannot be made in a Disk Array containing one or more Logical Drives with RAID Level being RAID 0.

init

[Overview]

Starts or stops Initialization.

[Format]

raidcmd **init** -c=<*controller*> -l=<*logicaldrive*> -op={start|stop} [-im={full|quick}]

Command Parameter	Description
-c=<*controller*>	Specify the RAID Controller to be processed. <*controller*> : RAID Controller Number
-l=<*logicaldrive*>	Specify the Logical Drive to be processed. <*logicaldrive*> : Logical Drive Number
-op={start|stop}	Specify that Initialize is started or stopped. start: Starts Initialize. stop: Stops Initialize.
[-im={full|quick}]	Specify the Initialize Mode. full: Full Initialize quick: Quick Initialize The full mode is selected if -im is omitted. -im is valid only when -op=start is specified.

[Description]

Starts Initialize of the specified Logical Drive or stops Initialize being executed for the specified Logical Drive.

[Condition]

Starting Initialize can be provided for a Logical Drive with its [Status] being [Online].
The Logical Drive containing the partition cannot Start Initialize.
Stopping Initialize can be provided for a Logical Drive with its [Status] being [Online] or [Degraded].

mkldc

[Overview]

Creates a Logical Drive with advanced parameter settings.

[Format]

Making a Logical Drive having RAID Level of RAID 0, RAID 1, RAID 5 or RAID 6:

raidcmd **mkldc** -c=<*controller*> {-p=<*physicaldevice1*>, <*physicaldevice2*> [,<*physicaldeviceX*>, ... ,<*physicaldeviceZ*>] | -a=<*diskarray*> } –rl={0 | 1 | 5 | 6} [-cp=<*capacity*>] [-ss={1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024}] [-cm={auto | writeback | writethru}] [-im={full | quick}] [-y]

Making a Logical Drive having RAID Level of RAID 10:
raidcmd **mkldc** -c=<*controller*> -p=<*physicaldevice1*>, <*physicaldevice2*> ,<*physicaldevice3*>,<*physicaldevice4*> –rl=10 [-ss={1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024}] [-cm={auto | writeback | writethru}] [-im={full | quick}] [-y]

Making a Logical Drive having RAID Level of RAID 50:
raidcmd **mkldc** -c=<*controller*> -p=<*physicaldevice1*>,<*physicaldevice2*>,<*physicaldevice3*>,<*physicaldevice4*>,<*physicaldevice5*>,<*physicaldevice6*>[,...,<*physicaldeviceX*>] –rl=50 [-ss={1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024}] [-cm={auto | writeback | writethru}] [-im={full | quick}] [-y]

Command Parameter	Description
-c=<*controller*>	Specify the RAID Controller connecting with Physical Devices used for the Logical Drive. <*controller*> : RAID Controller Number
Making a Logical Drive having RAID Level of RAID 0, RAID 1, RAID 5 or RAID 6 : { -p=<*physicaldevice1*> [,<*physicaldeviceX*>, ... ,<*physicaldeviceZ*>] } | -a=<*diskarray*>} Making a Logical Drive having RAID Level of RAID 10 : -p=<*physicaldevice1*>, <*physicaldevice2*> <*physicaldevice3*>,<*physicaldevice4*> Making a Logical Drive having RAID Level of RAID 50 : -p=<*physicaldevice1*>,<*physicaldevice2*>, <*physicaldevice3*>,<*physicaldevice4*>, <*physicaldevice5*>,<*physicaldevice6*> [,<*physicaldeviceX*>]	Specify Physical Devices used to create the Logical Drive or a Disk Array. The format is different from the RAID Level of the Logical Drive to be created. Use -p option to specify Physical Devices. <*physicaldevice1,2,X,Z*> : Physical Device Numbers. Delimit Physical Devices with ",". Specify -a option to specify a Disk Array. <*diskarray*> : Disk Array Number
-rl={0 | 1 | 5 | 6 | 10 | 50 }	Specify the RAID Level of the Logical Drive to be created as follows: 0 : RAID 0 1 : RAID 1 5 : RAID 5 6 : RAID 6 10 : RAID 10 50 : RAID 50
[-cp=<*capacity*>]	Specify the capacity of the Logical Drive to be created. <*capacity*>: capacity in GB Creates the Logical Drive of the maximum capacity available if -cp is omitted.
[-ss={1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024}]	Specify the Stripe Size of the Logical Drive to be created. 1KB, 2KB, 4KB, 8KB, 16KB, 32KB, 64KB, 128KB, 256KB, 512KB, 1024KB The default value for the RAID Controller is used if -ss is omitted.
[-cm={auto | writeback | writethru}]	Specify the Cache Mode of the Logical Drive to be created. auto : Auto Switch writeback : Write Back writethru : Write Through The default value for the RAID Controller is used if -cm is omitted.
[-im={full | quick}]	Specify the Initialize Mode of the Logical Drive to be created. full : Full mode quick : Quick mode The full mode is used if -im is omitted.
[-y]	Creates the Logical Drive immediately without displaying the message of confirming that the Logical Drive may be created.

[Description]

Creates a Logical Drive with advanced parameter settings.
The raidcmd create a Logical Drive and terminates after Initialize is started. You can check the progress and result of the Initialize by using "**oplist**" and "**property**" commands.

RAID Levels allowed to be created

RAID 0、RAID 1、RAID 5、RAID 6、RAID 10、RAID 50

Available Physical Devices

Physical Devices with [Status] of [Ready]

Physical Devices not used at all

Available Disk Array

Disk Array has empty area at the end. The RAID Level of the Logical Drive to be created must be the same as that of the Logical Drive existing on the same Disk Array.

Configuration of Disk Array and Logical Drive to be created

Creates a single Disk Array and a single Logical Drive with the specified Physical Devices if the Disk Array is created newly.

Capacity of Logical Drive with RAID Level of RAID 10 or RAID 50

For the RAID Level of RAID 10 or RAID 50, use the entire areas of Physical Devices to create a Logical Drive. You cannot specify the capacities of the Physical Devices.

[Condition]

This command can be executed only in the Advanced Mode.

mklds

[Overview]

Creates a Logical Drive with simple parameter settings.

[Format]

raidcmd **mklds** -c=<*controller*> -p=<*physicaldevice1*>, <*physicaldevice2*> [,<*physicaldeviceX*>, ... ,<*physicaldeviceZ*>] –rl={1 | 5} [-y]

Command Parameter	Description
-c=<*controller*>	Specify the RAID Controller connecting with Physical Devices used for the Logical Drive. <*controller*> : RAID Controller Number
-p=<*physicaldevice1*>, <*physicaldevice2*> [,<*physicaldeviceX*>, ... ,<*physicaldeviceZ*>]	Specify Physical Devices used to create the Logical Drive. <*physicaldevice1,2,X,Z*> : Physical Device Number Delimit the physical drives with ",".
-rl={1 | 5}	Specify the RAID Level of the Logical Drive to be created. 1 : RAID 1 5 : RAID 5
[-y]	Creates the Logical Drive immediately without displaying the message of confirming that the Logical Drive may be created.

[Description]

Creates a Logical Drive simply by specifying only two parameters, or Physical Devices used for the Logical Drive and RAID Level.

The raidcmd creates a Logical Drive and terminates after Initialize is started. You can check the progress and result of the Initialize by using "**oplist**" and "**property**" commands.

RAID Levels allowed to be created

RAID 1、RAID 5

Available Physical Devices

Physical Devices with [Status] of [Ready]

Physical Devices not used at all

Configuration of Disk Array and Logical Drive to be created

Creates a single Disk Array and a single Logical Drive with the specified Physical Devices.

Other parameters

Creates a Logical Drive with parameters set as follows:

Capacity : Creates a Logical Drive by using the entire areas of Physical Devices. The actual capacity varies depending on the RAID Level.

Stripe Size : 64KB

Cache Mode : Default mode of RAID Controller

Initialization Mode : Full

oplist

[Overview]

Displays the list of operations performed in a RAID Controller and their progresses.

[Format]

raidcmd **oplist**

[Description]

Displays the list of operations performed in a RAID Controller and their progresses.

Displayed operations

Initialization, Rebuild and Consistency Check

Display of terminated operation

oplist indicates operations being executed but does not indicate terminated operations.

optctrl

[Overview]

Allows you to set optional parameters of a RAID Controller.

[Format]

raidcmd **optctrl** -c=<*controller*> {-ip={high | middle | low} | -rp={high | middle | low} | -ccp={high | middle | low} | -pr={enable | disable} | -prp={high | middle | low} | -be={enable | disable} }

Command Parameter	Description
-c=<*controller*>	Specify the RAID Controller to be processed. <*controller*> : RAID Controller Number
-ip={high | middle | low}	Specify the Initialize Priority. high: High priority middle: Middle priority low: Low priority
-rp={high | middle | low}	Specify the Rebuild Priority. high: High priority middle: Middle priority low: Low priority
-ccp={high | middle | low}	Specify the Consistency Check Priority. high: High priority middle: Middle priority low: Low priority
-pr={enable | disable}	Specify whether Patrol Read is executed or not. enable: Executed disable: Not executed
-prp={high | middle | low}	Specify the Patrol Read Priority. high: High priority middle: Middle priority low: Low priority
-be={enable | disable}	Specify whether the Buzzer is enabled or disabled. enable: Enabled disable: Disabled

[Description]

Allows you to set optional parameters of the specified RAID Controller (including Initialize Priority, Rebuild Priority, Consistency Check Priority, Patrol Read execution and Priority, and Buzzer enable/disable).

Only a single parameter can be set at a time. Concurrent set of more than one parameter is disabled.

[Condition]

This command can be executed only in the Advanced Mode.

optld

[Overview]

Allows you to set optional parameters of a Logical Drive.

[Format]

raidcmd **optld** -c=<*controller*> -l=<*logicaldrive*> -cm={auto | writeback | writethru}

Command Parameter	Description
-c=<*controller*>	Specify the RAID Controller to be processed. <*controller*> : RAID Controller Number
-l=<*logicaldrive*>	Specify the Logical Drive to be processed. <*logicaldrive*> : Logical Drive Number
-cm={auto | writeback | writethru}	Specify the Cache Mode auto : Auto Switch writeback : Write Back writethru : Write Through

[Description]

Allows you to set optional parameters (Cache Mode) of the specified Logical Drive.

[Condition]

This command can be executed only in the Advanced Mode.

property

[Overview]

Displays the properties of RAID Controllers, Disk Arrays, Logical Drives and/or Physical Devices.

[Format]

raidcmd **property** –tg= { all | rc [-c=<*controller*>] | da -c=<*controller*> [-a=<*diskarray*>] | ld -c=<*controller*> [-l=<*logicaldrive*>] | pd -c=<*controller*> [-p=<*physicaldevice*>] }

Command Parameter	Description
-tg=all	Indicates the properties of all RAID Systems.
-tg=rc [-c=<*controller*>]	Indicates the property of the specified RAID Controller. Specify a RAID Controller Number with -c to indicate the property of the specific RAID Controller. Omit -c to indicate the properties of all RAID Controllers. <*controller*>: RAID Controller Number
-tg=da -c=<*controller*> [-a=<*diskarray*>]	Indicates the property of the Disk Array. Specify a RAID Controller Number with -c. Specify a Disk Array Number with -a to indicate the property of the specific Disk Array. Omit -a to indicate the properties of all Disk Arrays for the RAID Controller specified with -c. <*controller*> : RAID Controller Number <*diskarray*>: Disk Array Number
-tg=ld -c=<*controller*> [-l=<*logicaldrive*>]	Indicates the property of the Disk Array. Specify a RAID Controller Number with -c. Specify a Logical Drive Number with -a to indicate the property of the specific Logical Drive. Omit -l to indicate the properties of all Logical Drives for the RAID Controller specified with -c. <*controller*> : RAID Controller Number <*logicaldrive*>: Logical drive number
-tg=pd -c=<*controller*> [-p=<*physicaldevice*>]	Indicates the property of the Disk Array. Specify a RAID Controller Number with -c. Specify a Physical Device Number with -a to indicate the property of the specific Physical Device. Omit -p to indicate the properties of all Physical Devices for the RAID Controller specified with -c. <*controller*> : RAID Controller Number <*physicaldevice*>: Physical device number

[Description]

Displays the properties of RAID Controllers, Disk Arrays, Logical Drives and/or Physical Devices. The properties of all managed RAID Systems connected to the computer or those of specific RAID Controllers, Disk Arrays, Logical Drives and Physical Devices can be displayed.

rebuild

[Overview]

Starts or stops Rebuild.

[Format]

raidcmd **rebuild** -c=<*controller*> -p=<*physicaldevice*> -op={start|stop}

Command Parameter	Description
-c=<*controller*>	Specify the RAID Controller to be processed. <*controller*> : RAID Controller Number
-p=<*physicaldevice*>	Specify the Physical Device to be processed. <*physicaldevice*> : Physical Device Number
-op={start|stop}	Specify that Rebuild is started or stopped. start: Starts Rebuild. stop: Stops Rebuild.

[Description]

Starts Rebuild of the specified Physical Device or stops Rebuild being executed for the specified Logical Drive.

[Condition]

This command can be executed only in the Advanced Mode.
Starting Rebuild can be executed for a Physical Device with [Status] being [Failed] used by a Logical Drive with [Status] being [Degraded].

rescan

[Overview]

Update the RAID System management information of the Universal RAID Utility.

[Format]

raidcmd **rescan**

[Description]

This command collects the configuration information and state information of all of RAID systems managed by the Universal RAID Utility. The management information of RAID System in the Universal RAID Utility is the newest state by this command.

runmode

[Overview]

Changes the running mode of the raidcmd.

[Format]

raidcmd **runmode** [-md={a|s}]

Command Parameter	Description
[-md={a|s}]	Specify the altered running mode. If -md option is not specified, shows the current running mode. a: Advanced mode s: Standard mode

[Description]

Changes the running mode of the raidcmd or indicates the current running mode.

Valid period of mode after change

The running mode is valid unless it is changed by runmode command. The running mode remains unchanged if the computer is rebooted.

sbuzzer

[Overview]

Stops the Buzzer on a RAID Controller.

[Format]

raidcmd **sbuzzer** -c=<*controller*>

Command Parameter	Description
-c=<*controller*>	Specify the RAID Controller to be processed. <*controller*> : RAID Controller Number

[Description]

Stops the Buzzer sounding in the specified RAID Controller.
The command terminates normally if it is executed without Buzzer sounding.

slotlamp

[Overview]

Turns on or off the DISK lamp of the computer or enclosure in which Physical Devices are installed.

[Format]

raidcmd **slotlamp** -c=<*controller*> -p=<*physicaldevice*> -sw={on|off}

Command Parameter	Description
-c=<*controller*>	Specify the RAID Controller to be processed. <*controller*> : RAID Controller Number
-p=<*physicaldevice*>	Specify the Physical Device to be processed. <*physicaldevice*> : Physical Device Number
-sw={on|off}	Specify that the lamp is turned on or off. on: Turns on the lamp. off: Turns off the lamp.

[Description]

Turns on or off the DISK lamp on the computer or enclosure in which the specified Physical Device is installed.
Executing the raidcmd with -sw=on while the DISK lamp is already ON causes the command to terminate normally.
Executing the raidcmd with -sw=off while the DISK lamp is already OFF causes the command to terminate normally.

stspd

[Overview]

Changes the status of a Physical Device to online or failed forcibly.

[Format]

raidcmd **stspd** -c=<*controller*> -p=<*physicaldevice*> -st={online|offline} [-y]

Command Parameter	Description
-c=<*controller*>	Specify the RAID Controller to be processed. <*controller*> : RAID Controller Number
-p=<*physicaldevice*>	Specify the Physical Device to be processed. <*physicaldevice*> : Physical Device Number
-st={online|offline}	Specify the altered status. online: Online status offline: Failed status

Command Parameter	Description
[-y]	Changes the status without the message of confirming that the status may be changed.

[Description]

Changes the [Status] of the specified Physical Device to [Online] or [Failed].

[Condition]

This command can be executed only in the Advanced Mode.

Notes on Use of Universal RAID Utility

This chapter describes the notes on use of the Universal RAID Utility.

Operation Environment

Use of IPv6

The Universal RAID Utility cannot operate in the IPv6 (Internet Protocol version 6) environment. Use the Universal RAID Utility in the IPv4 environment. To manage a RAID System in the IPv6 environment, use the BIOS utility of the RAID Controller.

Use of Universal RAID Utility from Remote System

The Universal RAID Utility can see or manipulate the information on a RAID System only in the computer where the RAID System is installed. To use the Universal RAID Utility from a remote system, use the Windows remote desktop function or a commercial application having the remote console function.

RAID Viewer, Log Viewer

Verification authenticode signature when startup the RAID Viewer and Log Viewer

RAID Viewer and Log Viewer have the Authenticode signature. When you start the Microsoft .NET Framework Version 2.0 managed application that has a authenticode signature, .NET Framework Version 2.0 verify the validation of authenticode signature. Therefore if you use the computer not connected network and the computer connected bad quality network, may wait a few minutes until startup the RAID Viewer and Log Viewer.

Information
http://support.microsoft.com/kb/936707/en

Appendix A : Glossary

The terms used on the Universal RAID Utility are listed in the tables below.

Basic Terms on RAID System

Term	Description
RAID System	The RAID System has the ability of using hard disk drives in a computer as Disk Arrays. The RAID System handles a single RAID Controller as a single system.
RAID Controller	The RAID Controller can use hard disk drives as Disk Arrays.
Physical Device	Physical Devices are used by a RAID System. For most RAID Systems, Physical Devices mean hard disk drives. Physical Devices can be other than hard disk drives if the RAID Controller can connect with devices other than hard disk drives.
Disk Array	The virtual hard disk space is created by some Physical Devices. So, you cannot see Disk Array on operating system. You can create Logical Drive on Disk Array.
Logical Drive	The virtual hard disk drive is created on a Disk Array to be recognized by OS. A specific RAID Level should be set for each Logical Drive.
Hot Spare	Hard disk drives of the type are prepared previously to be replaced with a Physical Device in which a failure occurs.
Global Hot Spare	Available as a Hot Spare of any Disk Array in a single RAID Controller.
Dedicated Hot Spare	Available as a Hot Spare of a specific Disk Array in a single RAID Controller.
Battery	The battery is intended to hold the information on the cache memory in a RAID Controller if the power supplied to the RAID Controller is interrupted.
Cache Memory	The cache is intended to improve the I/O performance of a RAID Controller.
Enclosure	Means a module equipped with slots to which Physical Devices are inserted.
Fan Unit	Means a cooling fan unit installed in an enclosure.
Power Supply Unit	Means a power unit supplying power to an enclosure.
Power Sensor	Means a sensor monitoring the power supply unit in an enclosure.
Temperature Sensor	Means a sensor monitoring the temperature of an enclosure.
Enclosure Management Module	Means a module managing an enclosure.

Basic Terms on Functions of RAID System

Term	Description
Operation	Generic term of maintenance functions requiring certain periods for executions such as Rebuild and Consistency Check
Configuration	Means the configuration of a RAID System.
Initialize	Writes 0s into the entire area of a Logical Drive to erase the data in the Logical Drive.
Rebuild	Writes the data in a failed hard disk drive into a new hard disk drive replaced to Rebuild the Logical Drive.
Consistency Check	Reads all sectors on hard disk drives configuring a Logical Drive to verify the data or provide parity check.
Patrol Read	Reads all sectors on hard disk drives in a RAID System to check whether errors occur or not.
Cache Mode	Indicates the mode in which data is written into the cache memory in a RAID Controller.
Make Online	Means that a Physical Device is entered into the Online status manually.
Make Offline	Means that a Physical Device is entered into the Failed status manually.
Buzzer	Indicates a Buzzer installed in a RAID Controller. The Buzzer notifies you of occurrence of a failure with sound.

Basic Terms on Universal RAID Utility

Term	Description
Standard Mode	Default running mode of Universal RAID Utility. In the mode, you can use the standard functions for managing the RAID System.
Advanced Mode	Maintenance/high-performance mode of Universal RAID Utility. To use this mode, expert knowledge on RAID is required. You can mainly use the functions required for maintenance jobs, functions of setting data about a RAID System closely to configure the system and functions of changing parameters.
Easy Configuration	The function is provided by the Universal RAID Utility to configure a RAID System easily. Allows an optimum RAID System to be configured only by deciding the number of Physical Devices used by a Logical Drive and the number of Logical Drives for each RAID Controller.
RAID Log	Means the log for the Universal RAID Utility.
OS Log	Means the log provided by OS.
Alert	Means the operation of sending events such as failures occurred in a RAID System to external systems.
rescan	Means the operation of acquiring all the information on managed RAID Systems to update the information managed by the Universal RAID Utility to the latest.

Appendix B : Logs/Events

The list of log and event , alert messages that Universal RAID Utility logs to RAID Log and OS Log.

[Event Source, Alert Type]

Source Name of Event Log (only Windows) : raidsrv
Alert Type : URAIDUTL

[Log]
R : Universal RAID Utility logs this event to RAID Log.
O : Universal RAID Utility logs this event to OS log.

[Alert]
M and MA : Universal RAID Utility send this event to NEC ESMPRO Manager as alert.
(M) and (MA) : In case there is NEC ESMPRO Agent ESMDiskArray Ver 1.50 or later version on the computer, does not send this event to NEC ESMPRO Manager as alert.

[*Address*] description in [Description]
The [*Address*] description is different from the category of event.

Category of Event	Type	Description
RAID Controller Battery	1	[CTRL:%1(ID=%2)] %1 : Number of RAID Controller %2 : ID of RAID Controller
Physical Device	2	[CTRL:%1(ID=%2) PD:%3(ID=%4 ENC=%5 SLT=%6) %7%8] %1 : Number of RAID Controller %2 : ID of RAID Controller %3 : Number of Physical Device %4 : ID of Physical Device %5 : Enclosure Number of Physical Device %6 : Slot Number of Physical Device %7 : Vendor and Model of Physical Device %8 : Firmware Version of Physical Device
Logical Drive	3	[CTRL:%1(ID=%2) LD:%3(ID=%4)] %1 : Number of RAID Controller %2 : ID of RAID Controller %3 : Number of Logical Drive %4 : ID of Logical Drive
Enclosure	4	[CTRL:%1(ID=%2) ENC:%3] %1 : Number of RAID Controller %2 : ID of RAID Controller %3 : Number of Enclosure
Power Supply Unit in Enclosure	5	[CTRL:%1(ID=%2) ENC:%3 POW:%4] %1 : Number of RAID Controller %2 : ID of RAID Controller %3 : Number of Enclosure %4 : Number of Power Supply Unit
Fan Unit in Enclosure	6	[CTRL:%1(ID=%2) ENC:%3 FAN:%4] %1 : Number of RAID Controller %2 : ID of RAID Controller %3 : Number of Enclosure %4 : Number of Fan Unit

Event ID (hex digit)	Severity	Description	Log	Alert	Summary	Deal Method	Memo
0201 (400000C9)	Information	[*Address Type 1*] The buzzer of RAID Controller is enable.	R				
0202 (400000CA)	Information	[*Address Type 1*] The buzzer of RAID Controller is disable.	R				
0203 (400000CB)	Information	[*Address Type 1*] The Rebuild Priority of RAID Controller was changed. (Value : %1)	R				%1 : Changed value *1
0204 (400000CC)	Information	[*Address Type 1*] The Consistency Check Priority of RAID Controller was changed. (Value: %1)	R				%1 : Changed value *1
0205 (400000CD)	Information	[*Address Type 1*] The Initialize Priority of RAID Controller was changed. (Value : %1)	R				%1 : Changed value *1
0206 (400000CE)	Information	[*Address Type 1*] Auto Patrol Read function is enable.	R				
0207 (400000CF)	Information	[*Address Type 1*] Auto Patrol Read function is disable.	R				
0208 (400000D0)	Information	[*Address Type 1*] A Patrol Read Priority of RAID Controller was changed. (Value : %2)	R				%2 : Changed value *1
0209 (400000D1)	Information	[*Address Type 1*] Patrol Read was started.	R				
0210 (400000D2)	Information	[*Address Type 1*] Patrol Read completed.	R				
0211 (800000D3)	Warning	[*Address Type 1*] A Warning Error happened to RAID Controller. Detail : %1	RO	M	RAID Controller Warning	Please check the RAID Controller. If some kind of problem happens to the RAID Controller repeatedly, please replace it.	%1 : Detail information
0212 (C00000D4)	Fatal	[*Address Type 1*] A Fatal Error happened to RAID Controller. Detail : %1	RO	MA	RAID Controller Fatal	Please replace the RAID Controller.	1 : Detail information
0213 (400000D5)	Information	[*Address Type 1*] Patrol Read was paused.	R				
0214 (400000D6)	Information	[*Address Type 1*] Patrol Read was resumed.	R				
0215 (400000D7)	Information	[*Address Type 1*] Patrol Read was queued.	R				
0216 (400000D8)	Information	[*Address Type 1*] Patrol Read was stopped.	R				
0217 (C00000D9)	Fatal	[*Address Type 1*] Patrol Read failed.	RO	MA	Patrol Read Failed	Please disable the setting of Patrol Read and then enable it to retry Patrol Read. If Patrol Read fails again, the RAID System may have some problems. Please deal with the problem of the RAID System and retry Patrol Read.	

Event ID (hex digit)	Severity	Description	Log	Alert	Summary	Deal Method	Memo
0301 (4000012D)	Information	[*Address Type 2*] Physical Device is Online.	RO	(M)	Physical Device Online	None	
0302 (4000012E)	Information	[*Address Type 2*] Physical Device is Ready.	RO	(M)	Physical Device Ready	None	
0303 (4000012F)	Information	[*Address Type 2*] Physical Device is Hot Spare.	RO	(M)	Physical Device Hot Spare	None	
0304 (C0000130)	Fatal	[*Address Type 2*] Physical Device is Failed.	RO	(MA)	Physical Device Failed	Please replace the Physical Device.	
0305 (80000131)	Warning	[*Address Type 2*] Detected S.M.A.R.T. Error.	RO	(MA)	S.M.A.R.T. Error	Please replace the Physical Device.	
0306 (4000132)	Information	[*Address Type 2*] Rebuild was started.	RO	MA	Rebuild Started	None	
0307 (40000133)	Information	[*Address Type 2*] Rebuild completed.	RO	MA	Rebuild Completed	None	
0308 (C0000134)	Fatal	[*Address Type 2*] Rebuild failed.	RO	MA	Rebuild Failed	Please replace the Physical Device.	
0309 (40000135)	Information	[*Address Type 2*] Rebuild was stopped.	RO	MA	Rebuild Stopped	None	
0311 (40000137)	Information	[*Address Type 2*] Physical Device was inserted.	RO	M	Physical Device Inserted	None	
0312 (40000138)	Information	[*Address Type 2*] Physical Device was removed.	RO	M	Physical Device Removed	None	
0313 (40000139)	Information	[*Address Type 2*] Global Hot Spare created.	R				
0314 (4000013A)	Information	[*Address Type 2*] Dedicated Hot Spare created.	R				
0315 (4000013B)	Information	[*Address Type 2*] Global Hot Spare removed.	R				
0316 (4000013C)	Information	[*Address Type 2*] Dedicated Hot Spare removed.	R				
0317 (8000013D)	Warning	[*Address Type 2*] A Warning Error happened to Physical Device. Detail : %1	RO	M	Physical Device Warning	Please check the Physical Device. If some kind of problem happens to the Physical Device repeatedly, please replace it.	%1 : Detail information
0318 (C000013E)	Fatal	[*Address Type 2*] A Fatal Error happened to Physical Device. Detail : %1	RO	MA	Physical Device Fatal	Please replace the Physical Device.	%1 : Detail information
0319 (4000013F)	Information	[*Address Type 2*] Medium Error was detected in Physical Device and corrected. %1	RO	MA	Physical Device Medium Error(Correctable)	Please replace the Physical Device if too many errors are detected on a Physical Device.	%1 : Logical Block Address

Event ID (hex digit)	Severity	Description	Log	Alert	Summary	Deal Method	Memo
0320 (C0000140)	Fatal	[*Address Type 2*] Medium Error was detected in Physical Device but could not correct. %1	RO	MA	Physical Device Medium Error(Uncorrectable)	Please replace the Physical Device if too many errors are detected on a Physical Device.	%1 : Logical Block Address
0321 (40000141)	Information	[*Address Type 2*] Rebuild was paused.	R				
0322 (40000142)	Information	[*Address Type 2*] Rebuild was resumed.	R				
0323 (40000143)	Information	[*Address Type 2*] Rebuild was queued.	R				
0324 (80000144)	Warning	[*Address Type 2*] Medium Error was detected in Physical Device. %1	RO	MA	Physical Device Medium Error Detected	Please replace the Physical Device if too many errors are detected on a Physical Device.	%1 : Logical Block Address
0401 (40000191)	Information	[*Address Type 3*] Logical Drive is Online.	RO	(M)	Logical Drive Online	None	
0402 (80000192)	Warning	[*Address Type 3*] Logical Drive is Degraded.	RO	(MA)	Logical Drive Degraded	If there is Hot Spare, RAID System will rebuild automatically. If there is not it, please replace the Physical Device and rebuild it.	
0403 (C0000193)	Fatal	[*Address Type 3*] Logical Drive is Offline.	RO	(MA)	Logical Drive Offline	Please replace the Physical Device and recreate the Logical Drive. Next restore the backup data to the Logical Drive.	
0404 (40000194)	Information	[*Address Type 3*] Initialization was started.	R				
0405 (40000195)	Information	[*Address Type 3*] Initialization completed.	R				
0406 (C0000196)	Fatal	[*Address Type 3*] Initialization failed.	RO	MA	Initialization Failed	Please retry Initialization. If Initialization failed repeatedly, the RAID System may have some kind of problem. Please deal with the problem of the RAID System.	
0407 (400000197)	Information	[*Address Type 3*] Initialization was stopped.	R				
0409 (40000199)	Information	[*Address Type 3*] Consistency Check was started.	R				
0410 (4000019A)	Information	[*Address Type 3*] Consistency Check completed.	R				
0411 (C000019B)	Fatal	[*Address Type 3*] Consistency Check failed.	RO	MA	Consistency Check Failed	Please retry Consistency Check. If Consistency Check failed repeatedly, the RAID System may have some kind of problem. Please deal with the problem of the RAID System.	
0412 (4000019C)	Information	[*Address Type 3*] Consistency Check was stopped.	R				

Event ID (hex digit)	Severity	Description	Log	Alert	Summary	Deal Method	Memo
0413 (C000019D)	Fatal	[*Address Type 3*] Data Inconsistency was detected in Logical Drive by Consistency Check and corrected.	RO	MA	Data Inconsistency Error Corrected	Please execute Consistency Check again when the load of the system is low. If the error does not occur on the second time of Consistency Check, the Physical Device does not have any problems. If the same error occurs, please replace the Physical Device for the preventive maintenance (please be sure to ask NEC customer service before the replacement to identify which Physical Device has a failure). After replacing the Physical Device, restore the backup data to the Logical Drive.	
0415 (4000019F)	Information	[*Address Type 3*] Logical Drive was created.	R				
0416 (400001A0)	Information	[*Address Type 3*] Logical Drive was deleted.	R				
0417 (400001A1)	Information	[*Address Type 3*] The Cache Mode of Logical Drive was changed. (Value : %1)	RO	M	Cache Mode Changed	None	%1 : Changed value *1
0418 (400001A2)	Information	[*Address Type 3*] Background Initialization was started.	R				
0419 (400001A3)	Information	[*Address Type 3*] Background Initialization completed.	R				
0420 (800001A4)	Warning	[*Address Type 3*] Background Initialization failed.	RO	MA	Background Initialization Failed	The RAID System may have some kind of problem. Please deal with the problem of the RAID System.	
0421 (400001A5)	Information	[*Address Type 3*] Background Initialization was stopped.	R				
0422 (C00001A6)	Fatal	[*Address Type 3*] An error was detected in Logical Drive but could not correct.	RO	MA	Logical Drive Uncorrectable Error	Please replace the Physical Device (You need to ask it which Physical Device do you replace). After replacement of Physical Device, recreate the Logical Drive and restore the backup data to it.	
0423 (400001A7)	Information	[*Address Type 3*] An error was detected in Logical Drive and corrected.	RO	MA	Logical Drive Corrected Error	Please replace the Physical Device for the prevention of failure(You need to ask it which Physical Device do you replace). Next restore the backup data to the Logical Drive after replacement of Physical Device.	
0424 (800001A8)	Warning	[*Address Type 3*] A Warning Error happened to Logical Drive. Detail : %1	RO	M	Logical Drive Warning	The RAID Controller and/or the Physical Device may have some kind of problem. You need to ask it which component has broken.	%1 : Detail Information

Event ID (hex digit)	Severity	Description	Log	Alert	Summary	Deal Method	Memo
0425 (C00001A9)	Fatal	[*Address Type 3*] A Fatal Error happened to Logical Drive. Detail : %1	RO	MA	Logical Drive Fatal	The RAID Controller and/or the Physical Device may have some kind of problem. You need to ask it which component has broken.	%1 : Detail information
0426 (400001AA)	Information	[*Address Type 3*] Initialization was paused.	R				
0427 (400001AB)	Information	[*Address Type 3*] Initialization was resumed.	R				
0428 (400001AC)	Information	[*Address Type 3*] Initialization was queued.	R				
0429 (400001AD)	Information	[*Address Type 3*] Consistency Check was paused.	R				
0430 (400001AE)	Information	[*Address Type 3*] Consistency Check was resumed.	R				
0431 (400001AF)	Information	[*Address Type 3*] Consistency Check was queued.	R				
0432 (400001B0)	Information	[*Address Type 3*] Background Initialization was paused.	R				
0433 (400001B1)	Information	[*Address Type 3*] Background Initialization was resumed.	R				
0434 (400001B2)	Information	[*Address Type 3*] Background Initialization was queued.	R				
0501 (400001F5)	Information	[*Address Type 1*] Battery was detected.	R				
0502 (800001F6)	Warning	[*Address Type 1*] Battery was disconnected.	RO	MA	Battery Disconnect	Please check the Battery. If some kind of problem happen to the Battery repeatedly, please replace it.	
0503 (400001F7)	Information	[*Address Type 1*] Battery was replaced.	R				
0504 (400001F8)	Information	[*Address Type 1*] The temperature of battery is normal.	R				
0505 (800001F9)	Warning	[*Address Type 1*] The temperature of battery is high.	RO	M	Battery Temperature High	Please check the Battery. If some kind of problem happens to the Battery repeatedly, please replace it.	
0506 (800001FA)	Warning	[*Address Type 1*] The voltage of battery is low.	RO	M	Battery Voltage Low	Please check the Battery. If some kind of problem happens to the Battery repeatedly, please replace it.	
0507 (800001FB)	Warning	[*Address Type 1*] A Fatal Error happened to battery .	RO	MA	Battery Fatal	Please replace the Battery.	

Event ID (hex digit)	Severity	Description	Log	Alert	Summary	Deal Method	Memo
0508 (800001FC)	Warning	[*Address Type 1*] The Battery state is unstable.	RO				
0509 (400001FD)	Information	[*Address Type 1*] The voltage of Battery is normal.	RO	M	Battery Voltage Normal	None	
0601 (80000259)	Warning	[*Address Type 4*] A Warning Error happened to Enclosure.	RO	M	Enclosure Warning	Please check the Enclosure. If some kind of problem happens to the Enclosure repeatedly, please deal with the problem of the Enclosure.	
0602 (C000025A)	Fatal	[*Address Type 4*] A Fatal Error happened to Enclosure.	RO	MA	Enclosure Fatal	Please check the Enclosure. If some kind of problem happens to the Enclosure repeatedly, please deal with the problem of the Enclosure.	
0603 (8000025B)	Warning	[*Address Type 4*] The temperature of Enclosure is Warning level.	RO	M	Enclosure Temperature Warning	Please check the Fan Unit of the Enclosure. If some kind of problem happens to the Fan Unit, please deal with the problem.	
0604 (C000025C)	Fatal	[*Address Type 4*] The temperature of Enclosure is Fatal level.	RO	MA	Enclosure Temperature Fatal	Please check the Fan Unit of the Enclosure. If some kind of problem happens to the Fan Unit, please deal with the problem.	
0605 (8000025D)	Warning	[*Address Type 5*] An error happened to the Power Supply Unit of Enclosure.	RO	MA	Enclosure Power Supply Unit Error	Please check the Power Supply Unit of the Enclosure. If some kind of problem happens to the Power Supply Unit, please deal with the problem.	
0606 (8000025E)	Warning	[*Address Type 6*] An error happened to the Fan Unit of Enclosure.	RO	MA	Enclosure Fan Unit Error	Please check the Fan Unit of the Enclosure. If some kind of problem happens to the Fan Unit, please deal with the problem.	
0607 (4000025F)	Information	[*Address Type 4*] The temperature of Enclosure is Normal level.	RO	MA	Enclosure Temperature Normal	None	
0701 (400002BD)	Information	[*Address Type 1*] The Configuration was cleared.	RO	M	Configuration Cleared	None	

Event ID (hex digit)	Severity	Description	Log	Alert	Summary	Deal Method	Memo
0702 (400002BE)	Information	raidsrv Configuration [CTRL:%1(ID=%2)] Vendor Product Firmware Version [LD:%3(ID=%4)] RAID:*RAIDlevel* PD:*X*,*Y*,*Z* (count of LD STS:*Status* [PD:%5(ID=%6 ENC=%7 SLT=%8] Vendor/Model Firmware Version STS:Status %1 : Number of RAID Controller %2 : ID of RAID Controller %3 : Number of Logical Drive %4 : ID of Logical Device %5 : Number of Physical Device %6 : ID of Physical Device %7 : Enclosure Number of Physical Device %8 : Slot Number of Physical Device	0				*X*, *Y*, *Z* : Number of Physical Device used in Logical Drive. There is not the STS of PD when the device type is not HDD or HDD(SSD).

*1 : This item may not include in log message by the type of RAID Controller